

AD-A066 031

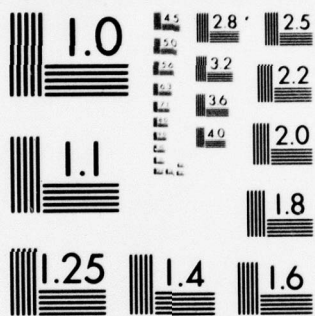
NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. POCANTICO LAKE DAM, (INVENTORY NUM--ETC(U)
AUG 78 J B STETSON DACW51-78-C-0035

UNCLASSIFIED

NL

| OF |
AD
A066031





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

LEVEL II

5

LOWER HUDSON RIVER BASIN

ADAO 66031

POCANTICO LAKE DAM
WESTCHESTER COUNTY
NEW YORK
INVENTORY NO 49

DDC
RECEIVED
MAR 21 1979
C
1473

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED
CONTRACT NO. DACW 51-78-C-0035

DDC FILE COPY

15

6



National Dam Safety Program.
Pocantico Lake Dam, Lower Hudson River
Basin, Westchester County, New York
(Inventory Number 49), Phase I
Inspection Report.

10 John B. Stetson

NEW YORK DISTRICT CORPS OF ENGINEERS

11

AUGUST 1978

12

94 P.

393970

79 03 15 047

B

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, NEW YORK
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

2 OCT 1978

NANEN-F

Honorable Hugh L. Carey
Governor of New York
Albany, New York 12224

Dear Governor Carey:

The purpose of this letter is to inform you of a clarification of the guidelines used by this office in assessing dams under the National Program of Inspection of Dams.

Office of the Chief of Engineers has recently provided a clarification that dams with seriously inadequate spillways are to be assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The following dams in your state have previously been assessed as having seriously inadequate spillways, with capability to pass safely only the percentage of the probable maximum flood as noted in each report. They are now to be assessed as unsafe:

<u>I.D. NO.</u>	<u>NAME OF DAM</u>
N.Y. 59	Lower Warwick Reservoir Dam
N.Y. 4	Salisbury Mills Dam
N.Y. 45	Amawalk Dam
N.Y. 418	Jamesville Dam
N.Y. 685	Colliersville Dam
N.Y. 6	Delta Dam
N.Y. 421	Oneida City Dam
N.Y. 39	Croton Falls Dam
N.Y. 509	Chadwick Dam (Plattenkill)
N.Y. 66	Boyd's Corner Dam
N.Y. 397	Cranberry Lake Dam
N.Y. 708	Seneca Falls Dam
N.Y. 332	Lake Sebago Dam
N.Y. 338	Indian Brook Dam
N.Y. 33	Lower(S) Wiccopee Dam (Lower Hudson W.S. for Peekskill)

NANEN-F

Honorable Hugh L. Carey

<u>I.D. NO.</u>	<u>NAME OF DAM</u>
N.Y. 49	Pocantico Dam
N.Y. 445	Attica Dam
N.Y. 658	Cork Center Dam
N.Y. 153	Jackson Creek Dam
N.Y. 172	Lake Algonquin Dam
N.Y. 318	Sixth Lake Dam
N.Y. 13	Butlet Storage Dam
N.Y. 90	Putnam Lake (Bog Brook Dam)
N.Y. 166	Pecks Lake Dam
N.Y. 674	Bradford Dam
N.Y. 75	Sturgeon Pool Dam
N.Y. 414	Skaneateles Dam
N.Y. 155	Indian Lake Dam
N.Y. 472	Newton Falls Dam
N.Y. 362	Buckhorn Lake Dam

The classification of "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam.

Consequently, it is advisable to implement the recommendations previously furnished in the reports for the above-mentioned dams as soon as practicable.

It is requested that owners of these dams be furnished a copy of this letter and that copies be permanently appended to all reports previously furnished to you.

Sincerely yours,

CLARK H. BENN
Colonel, Corps of Engineers
District Engineer

TABLE OF CONTENTS

	<u>Page</u>
Assessment of General Conditions	i
Photographic Overview of Dam	ii-ix
Section 1 - Project Information	1-4
Section 2 - Engineering Data	5
Section 3 - Visual Inspection	6
Section 4 - Operational Procedures	7
Section 5 - Hydraulic/Hydrology	8-9
Section 6 - Structural Stability	10-12
Section 7 - Assessment/Remedial Measures	13

FIGURES

- Figure 1 - Location Plan
- Figure 2 - Plan (May 1916)
- Figure 3 - Detail Plan and Sections (May 1916)
- Figure 4 - Topographical Plan
- Figure 5 - Plan for Raising Spillway
- Figure 6 - Schematic Profile (May 1963)

APPENDIX

Field Inspection Report	A
Previous Inspection Reports/Relevant Correspondence	B
Hydrologic and Hydraulic Computations	C
References	D

ACCESSION FOR		
NTIS	<input checked="" type="checkbox"/>	
DOC	<input type="checkbox"/>	
UNANNOUNCED	<input type="checkbox"/>	
JUSTIFICATION		
BY		
DISTRIBUTION/AVAILABILITY NOTES		
DATE		
A		

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Pocantico Dam NY49

State Located New York
County Located Westchester
Stream Pocantico River
Date of Inspection July 26, 1978

ASSESSMENT OF
GENERAL CONDITIONS

The Pocantico Dam is a water supply reservoir which has been discontinued as a source for water supply by the New Rochelle Water Company in 1977. At this time, routine maintenance of the facility is being performed by on-site personnel. The earthen dam does not show physical signs of distress. At the time of inspection, the reservoir water surface level was being kept well below the spillway elevation. A hydrologic investigation has determined the spillway to be seriously inadequate. Steps should be taken to insure the facility is at least capable of passing a 1/2 Probable Maximum Flood (PMF). Since the spillway has been found to be seriously inadequate it is recommended that immediately, during periods of unusually high runoff, the owner should provide around-the-clock surveillance and have a contingency plan in the event of overtopping. The spillway is currently only capable of passing 28 percent of the PMF. A rather sizable tourist area (Sleepy Hollow Restorations) exists downstream of the facility and reportedly receives 1400 visitors per week.



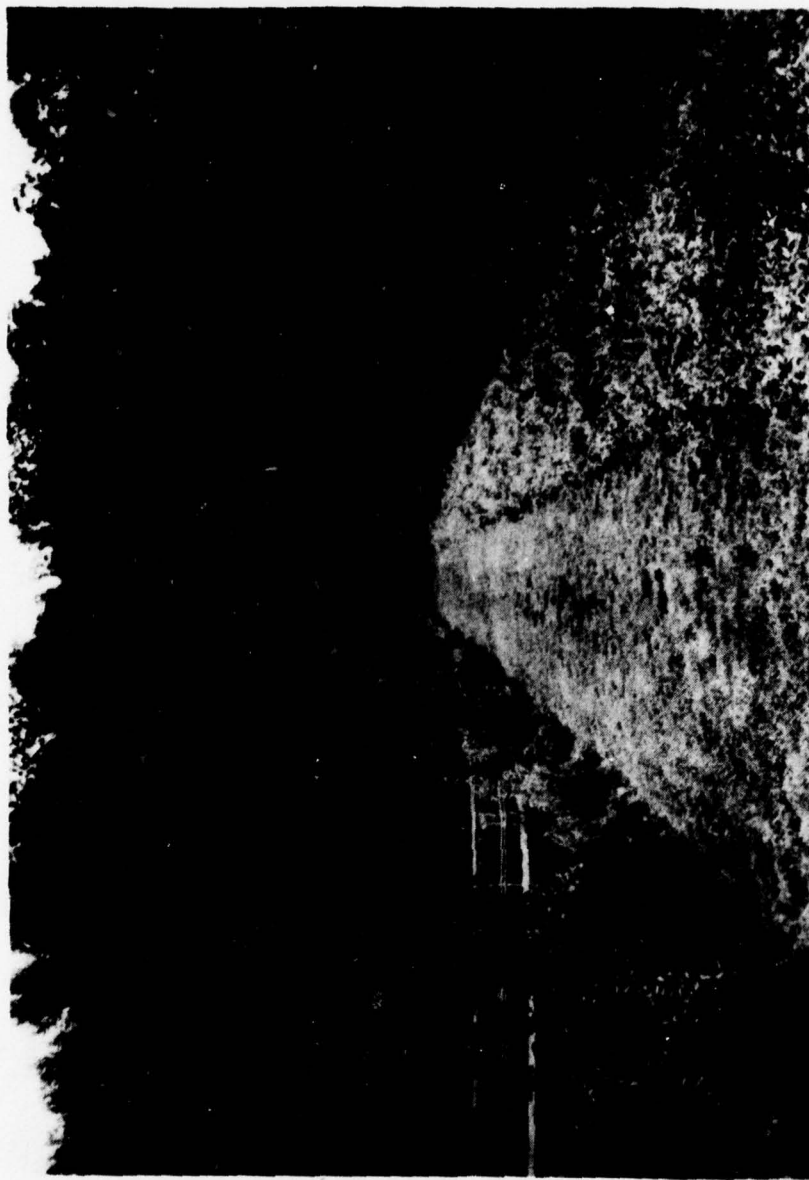
Approved By:
Date:

Dale Engineering Company

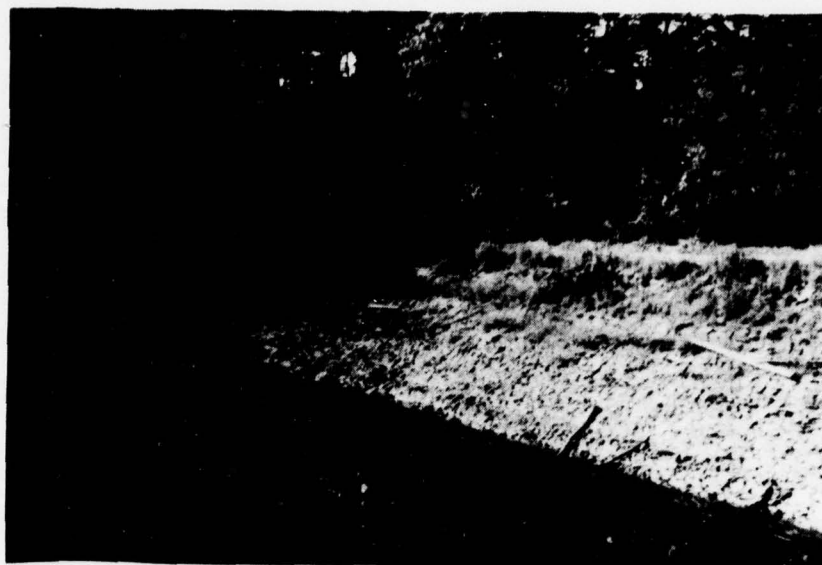
John B. Stetson
John B. Stetson, President

Clark H. Bern
Col. Clark H. Bern
New York District Engineer

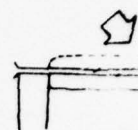
19 September 1978



Overview of top of earthen dam.



UPSTREAM



DOWNSTREAM

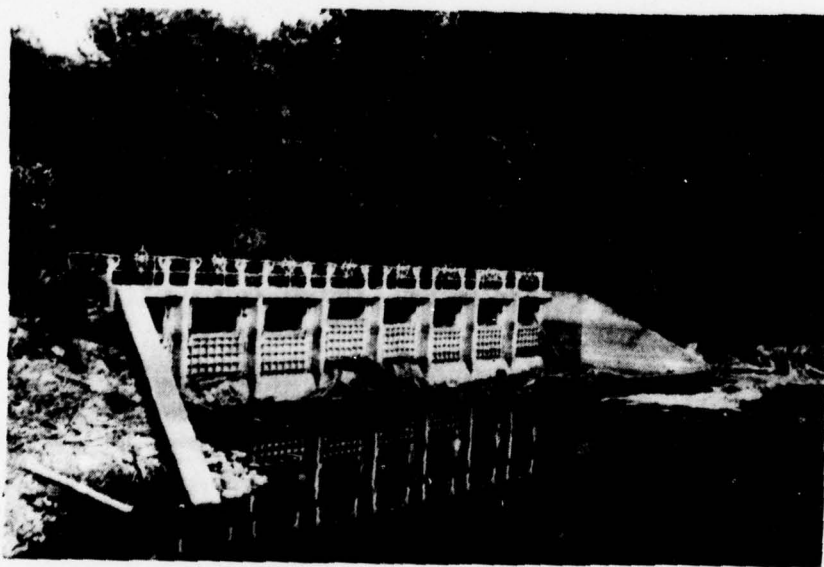
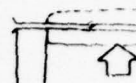
1. View of riprap on face of dam.



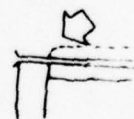
2. View of intake tower on upstream face of dam.



3. View of reservoir upstream of dam.

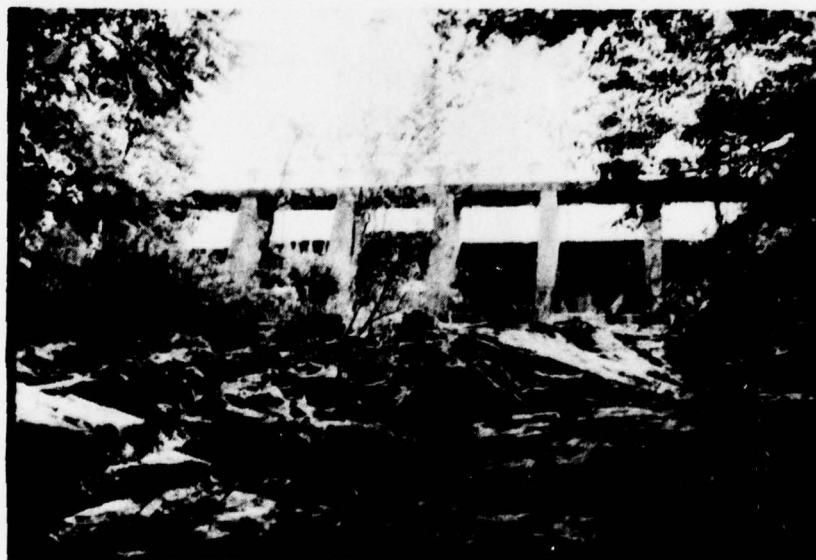


4. View of spillway structure with eight 8 X 4 sluice gates.





5. Manually operated gate equipment.



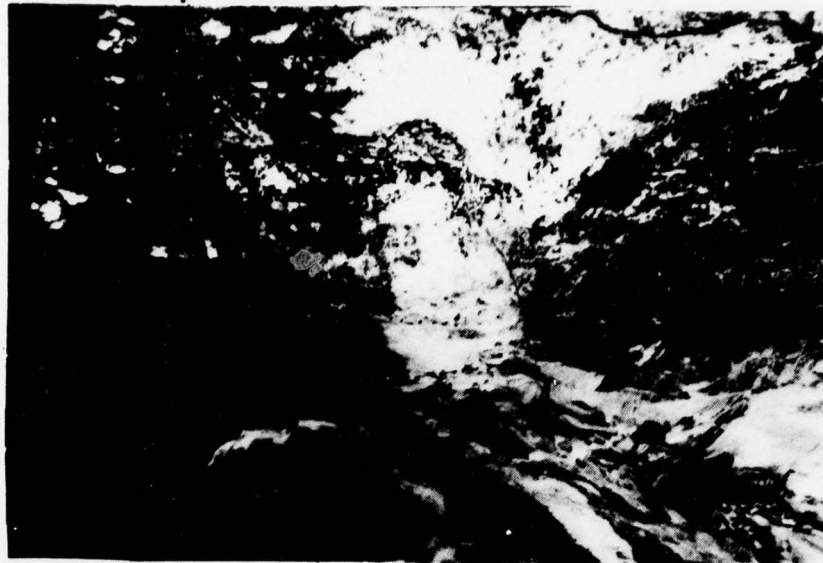
6. View of spillway from downstream channel.



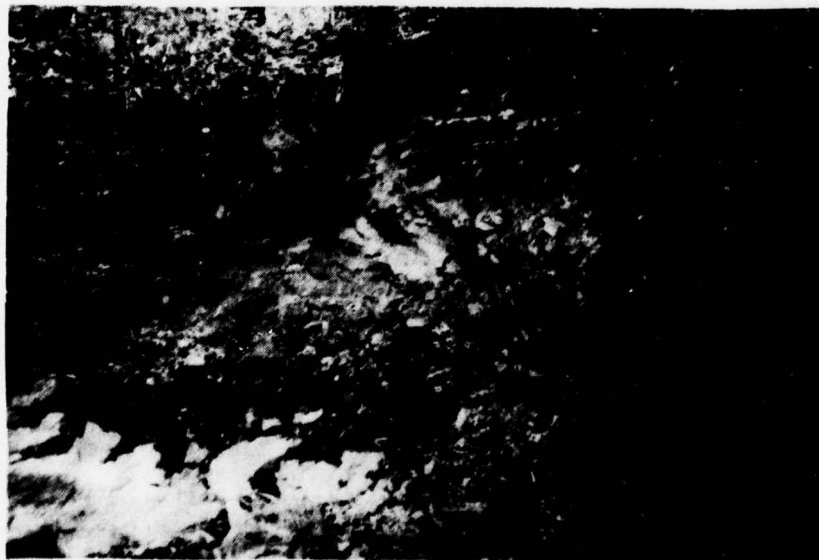
7. Detail of spillway gate dividing wall showing cracks.



8. Detail of spillway floor slab.



9. Downstream channel.



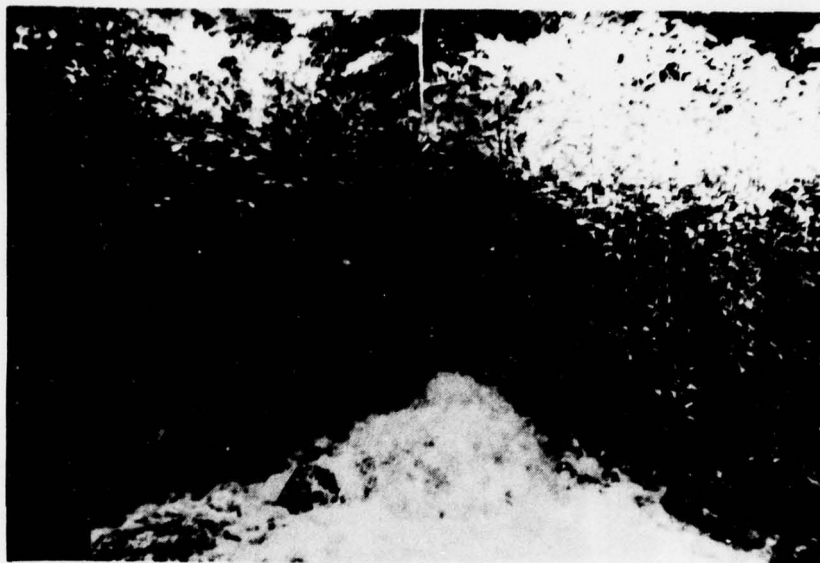
10. Detail of embankment erosion in downstream channel.



11. Abandoned filtration plant below dam.



12. Cattails at toe of embankment near storage tank. Wetness from either seepage or poor surface drainage.



13. Outflow discharge pipe.



14. Cavity in east abutment embankment area below dam. Some water flowing.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - POCANTICO ID# - NY49

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Pocantico Dam and appurtenant structures, owned by the New Rochelle Water Company, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Pocantico Dam is an earth fill dam with a short concrete core wall which extends to approximately 14-1/2 feet below the top elevation of the dam. The width of the top of the dam is approximately 12 feet. The dam is approximately 35 feet high and approximately 300 feet in total length. The upstream slope of the embankment is 2 feet horizontal on 1 foot vertical. The downstream slopes are 1-3/4 horizontal on 1 vertical. The upstream face of the embankment is riprapped at the waterline. The spillway is located near the west abutment of the main structure. The spillway is approximately 75 feet long and is controlled by eight 4 feet high by 8 feet wide sluice gates which are manually operated from a bridge across the spillway. The spillway is constructed on bedrock and discharges through a bedrock channel down to the Pocantico River.

The main drainline for the reservoir is a 24 inch pipe which is controlled from the intake structure and discharges downstream in the Pocantico River. The operator of the dam indicates that this drain is partially obstructed so that full outlet flow can not be obtained.

b. Location

Pocantico Lake Dam is located in the Town of Mount Pleasant in Westchester County, New York.

c. Size Classification

The maximum height of the dam is approximately 35 feet. The storage volume of the dam is approximately 1,595 acre feet to the top elevation of the dam. Therefore, the dam is in the intermediate size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The Pocantico River, the receiving stream from the impoundment flows through Philipsburgh Manor, a portion of the Sleepy Hollow Restorations. This popular tourist area is open to the public and large numbers of tourist daily move about the area. The site receives 1400 visitors per week. Therefore, the dam is in the high hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the New Rochelle Water Company.

f. Purpose of Dam

The dam has recently been abandoned as a water supply reservoir for the New Rochelle Water Company. Therefore, the facility has at present no useful purpose except to maintain the environment that has existed in the area for many years. No significant recreational use is made of the facility at the present time.

g. Design and Construction History

No information was found to indicate the date of the original construction of the dam. Construction drawings dated May, 1916, indicate a reconstruction which took place during that time. The reconstruction consisted of the raising of the dam and the improvement of the spillway control. This project also indicates the construction of a core wall through the center of the embankment which extends only 14-1/2 feet below the top of the dam as it was reconstructed.

h. Normal Operational Procedures

The dam site is currently staffed by the Water Company. At this time, the status of operational procedures for the dam is not known. The dam is currently not operational (normal use).

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of the Pocantico Dam is 10.48 square miles.

b. Discharge at Dam Site

No discharge records are available at this site.

Computed Discharges:

Spillway capacity, top of dam	4000 cfs
Spillway design flood, (with gates fully open)	6830 cfs (1/2 PMF)
	14000 cfs (PMF)

c. Elevation (feet above MSL)

Top of dam*	225.0
Spillway design flood - 1/2 PMF discharge	226.7
PMF discharge	229.2
Spillway crest	215.0
Stream bed at centerline of dam	185.0

d. Reservoir

Length of maximum pool	10000 feet
Length of normal pool	10000 feet

e. Storage

Top of dam	1595 acre feet
Normal pool	920 acre feet

f. Reservoir Surface

Top of dam	91.0 acre
Spillway pool	67.2 acre

g. Dam

Type - Earth fill with concrete core wall.
Length - 300 feet.
Height - 35 feet.

*Plans in this report show various elevations, some related to proposed improvements.

Freeboard between normal reservoir and top of dam - 6 feet with gates closed, 10 feet with gates open.

Top width - 6 feet, 6 inches.

Side slopes - 2 horizontal to 1 vertical upstream.

1-3/4 horizontal to 1 vertical downstream.

Zoning - None indicated.

Impervious core - Concrete core wall to elevation 223.

Grout curtain - None indicated.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The information available for review for the Pocantico Dam included:

- 1) The plans reviewed are enclosed in this report in Figures 1 through 6.

2.2 CONSTRUCTION

No information available.

2.3 OPERATION

See Section 4.

2.4 EVALUATION

The data reviewed indicates that a number of structure modifications to the facility were either performed or planned. The construction documents infer that the dam was constructed prior to 1916 whereas the May 10, 1916 plans represent an improvement to the facility. In the information available for review, the dam lacks sufficient information to evaluate the construction records. It is not known if additional information on the dam exists or where it could be located. Due to the present status and condition of the facility, (with consideration given to the recommendations provided herein, See Section 7) it is not deemed necessary to try to locate additional data. The visual examination and the data reviewed were considered adequate for this Phase I investigation.

SECTION 3 - VISUAL INSPECTION

3.1 SUMMARY

a. General

The visual inspection of Pocantico Dam took place on July 26, 1978. The dam has functioned as a reservoir for a water treatment facility owned by the New Rochelle Water Company. In 1977 the use of the facility for water supply was abandoned. The property is currently staffed with water department employees utilizing the structure at the facility as a storage and maintenance facility. At time of inspection the water level was six feet below the spillway. See Section 6 for additional narrative information.

b. Dam

The dam and spillway visually conform to the plans as provided in this report. The embankment has tall grasses and small brush. It is generally in good condition with no areas of seepage or erosion found on the downstream face of the embankment. The low head in the reservoir could however, reduce or eliminate evidence of seepage at the time of inspection. Photograph 12 shows cattails at the toe of the embankment near the storage tank. This wetness could be from either seepage or poor surface drainage. Seepage has been noted before by the plant operator when the reservoir has a full normal head. Photograph 14 also shows some water flowing in a cavity or trench area of unknown origin in the east abutment which leads up to a pair of stilling basins. These areas should be checked for seepage again when the reservoir is known to have a significant head.

c. Spillway

The spillway concrete sill shown in Photograph 8 is in fair condition. Some wear of the surface material has taken place. One of the spillway's dividing wall and support frame for the sluice gates is cracked as shown in Photograph 7. The spillway gates, shown in Photograph 5, are reported to be operable but are not well maintained so as to be easily operated.

d. Appurtenant Structures

The drawdown and treatment plant intake structure is in the center of the upstream face of the dam. The rod for the draindown gate is broken off with the gate operating partially open. Therefore, the dam cannot be drawn down without repair of the control rod unless flows are directed through the filtration equipment. It is not known whether this is possible or practical.

e. Downstream Channel

The channel immediately below the spillway is shown in Photograph 6. It is largely exposed rock. Photograph 10 shows some embankment erosion further downstream. This is not considered serious.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

Operational procedures have not been documented or written up by the owner nor were they demonstrated to the inspection team. The lowest drawdown gate is presently inoperable. The spillway sluice gates were reported to be operable but are manually operated and cannot be turned very easily. The use of the dam and reservoir as a water supply source has been discontinued. At this time, the owner has no future intention of using the facility for a water supply.

4.2 MAINTENANCE

The facility currently has on-site staff personnel working in the shop and storage facilities in the plant. Currently, the embankment slopes and level of the reservoir are being maintained.

SECTION 5 - HYDROLOGY AND HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data

For this report, no information relevant to the hydrologic and/or hydraulic design for the dam was available. The hydrologic and hydraulic analysis provided in Appendix C was performed utilizing information obtained from construction documents and other sources of information listed in the reference section of this report. Pocantico Dam is an earthen type dam with a spillway structure containing eight (8) sluice gates. The dam is not readily accessible to the general public. The drainage area contributing to the reservoir is approximately 10.5 square miles including 0.167 square miles of reservoir water surface. The volume of the impoundment is purely a function of natural watershed. For the dam's location, no information was available on historical flood events.

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and/or adequacy. This potential was assessed in the development of the Probable Maximum Flood (PMF) for the watershed and a subsequent routing through the reservoir system. PMF is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration runoff of a specific location that is considered reasonably possible for a particular drainage area. Since this dam is in the intermediate category with a high hazard, the guidelines (Ref. 1) require the dam to pass the Probable Maximum Flood. The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. In preparing the hydrograph, both Clark and Snyder coefficients were estimated. For the Clark Method values of $T_c = 7.63$ and $R = 4.88$ were computed. For the Snyder Method, values of $T_{pr} = 2.73$ and $CP = 0.625$ were computed. Two unit hydrographs were developed from these parameters and two sets of hydrographs were later computed for the purposes of comparison. The resulting computations were not similar. Since the Snyder parameter produced excessive PMF discharges for this size of a drainage basin, the Clark Method parameters were used for evaluation of the spillway capacity. The Probable Maximum Flood (PMF) hydrograph was determined using Probable Maximum Precipitation rainfall data obtained in Hydrometeorological Report No. 51. An index rainfall of 24 inches for 200 square miles for a period of 24 hours was used in the analysis. Both the PMF and 1/2 PMF were evaluated. The 1/2 PMF was assumed to be approximately the Standard Project Flood (SPF) in utilizing U.S. Army Corps of Engineers, Hydrologic Engineering Centers, Computer Program (UHCOMP). The peak discharges for the Clark Method were 6,831 cfs for the 1/2 PMF (SPF) and 14,000 cfs for the PMF. The peak discharges for the Snyder Method were 11,400 cfs for the 1/2 PMF (SPF) and 23,500 cfs for the PMF. Hydraulic studies were performed at the spillway structure. These computations, which assumed the sluice gates would remain open, are shown in Appendix C.

The U.S. Army Corps of Engineers, Hydrologic Engineering Centers, Program HEC-1 using the Modified Puls Method for flood routing was used to evaluate the structure and the reservoir. The peak flow discharges were not reduced by the storage effect of the reservoir. The spillway capacity with the gates fully opened is about 4000 cfs. The spillway capacity is 28 percent of the PMF. The analysis indicates the dam would be topped by 2 feet with the 1/2 PMF (SPF) event and by 4 feet with the PMF event. Further work should be performed to determine the accuracy of the computed discharges. Since the dam has been abandoned, removal of the spillway sluice gate works may provide sufficient discharge conveyance section to pass the 1/2 PMF (SPF). This investigation has been determined that due to the very small reduction of the peak discharge from the reservoir storage effect, drawing down the reservoir alone as a remedial measure will probably not be sufficient to prevent overtopping of the dam from 1/2 PMF (SPF).

b. Experience Data

The Owner's Representative at the site was not able to provide information relevant to performance of the spillway during extreme rainfall events.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations And Data Review

The reservoir dam (embankment section) shows no evidence of misalignment, sloughing, surface cracks or erosion of significance which would be indicative of structural movement or distress. The condition of riprap on the upstream face is rated fair to good. Some low vegetation, including small trees and shrubs, are growing along the top of the embankment and the upper upstream slope (generally above the riprap elevations). The embankments downstream face is covered with grasses and low vegetation, with a few small trees and shrubs at various locations. Large trees exist on the downstream slope in the vicinity of both the easterly and westerly abutments.

The spillway is a concrete gated structure. Eight sluice gates approximately four feet wide are provided. The reservoir was drawn down some 6 feet below its normal level at the time of the inspection, a condition which revealed the presence of considerable debris (tree branches, other miscellaneous waste items) against the spillway gates. The spillway's structural concrete components are generally in fair to good condition, although spalling is occurring at various locations, and some cracks exist.

The spillway discharge channel floor (to the Pocantico River) consists of bedrock. This discharge channel is provided with laid up stone sidewalls. Vegetation is growing in the channel floor (through rock seams and cracks) and the stone sidewalls.

Concrete water settling/treatment pools, now abandoned, remain immediately downstream of the dams easterly abutment, at a level approximately midway between the top and toe elevations of the embankment. A large ground level steel storage tank exists just below the downstream toe close to the easterly end of the dam, near the toe of slope of the area where the above mentioned settling tanks are located. The reservoir facilities pump house and an adjacent residential building are located immediately below the embankments westerly downstream toe. No water seepage through or beneath the dam was noted on the embankment slope and area below the downstream toe or in the basements of the pump house and residential building. However, cattails exist at the downstream toe of embankment adjacent to the ground level water storage tank. Operating personnel assigned to the reservoir indicate that a dampness/seepage condition typically develops along the westerly section of the embankments downstream toe in wet seasons.

Close examination of the area indicated no evidence of erosion or piping.

Some seepage was noted near the toe of the slope provided for the abandoned concrete settling tanks located immediately downstream of the dams easterly abutment. A low stone retaining wall has been constructed at the seepage location. The seepage condition apparently has been on-going for a considerable number of years. It appears that the seepage is from a spring or other source outside of the reservoir embankment area.

b. Geology and Seismic Stability

The New York State Geologic Map (1970) indicates the reservoir is situated on Fordham Gneiss. This foliated rock is composed of biotite, hornblende, quartz, and plagioclase. The 1916 reports indicate that the spillway is on natural rock, (gneiss).

Although gneiss has considerable strength and bearing capacity, weathering of the biotite and hornblende components of the rock may yield rotted seams conducive to seepage.

There are no known faults in the vicinity of the reservoir according to the New York State Geologic Survey (1977). The closest known fault shown is four miles west of the dam, across the Hudson River. Of earthquakes listed below, most of the epicenters are not located in the vicinity of any known faults.

Some of the earthquakes recorded for the area are tabulated below:

<u>Date</u>	<u>Intensity-Modified Mercalli</u>	<u>Location Relative to Dam</u>
1916	IV	8 mi. SSE
1933	III	8 mi. SSE
1936	IV	8 mi. E
1937	II	6 mi. NNE
1938 (2)	III	8 mi. NE
1941	III	5 mi. ENE
1964 (2)	II	8 mi. NE
1964	V	8 mi. NE
1967	V	6 mi. NNE

The reservoir dam is located in an area designated Zone 1 on the Seismic Probability Map.

c. Data Review and Stability Evaluation

Available design drawings imply that the dam consists of a homogeneous earth embankment.

The present dam is approximately ten feet higher, and greater in cross section, than the original dam constructed at this site. Additional work should be performed to determine exactly which plans are accurate to the site; a number of different elevations are referenced on different drawings for the elevation of the top of the dam.

Downstream and upstream slopes of approximately 2 to 1 (horizontal to vertical) are indicated. No information is available on the embankment foundation, make-up of the earthen interior, or method of soil placement and compaction.

At present, the embankment is considered to be in good structural condition with no indication of instability or deterioration. The reported past periodic seepage, which was not occurring at the time of inspection, has not had a significant effect on the condition of the embankment. To reduce hazards associated with future operations, trees on slopes of the dam should be removed to eliminate the potential for embankment seepage and structural damage which could occur from a storm-caused uprooting. Slope grasses should be mowed to enable rapid detection of possible seepage occurrences. It is anticipated that, properly maintained, this earthen embankment will continue to serve satisfactorily for future loading conditions which are similar to those of the past.

The spillway structure should be kept clear of debris which could interfere with proper operation of sluice gates and spillway flow. Repair of damaged/deteriorated concrete in the spillway structure should be undertaken to prevent progressive effects. The area downstream of the spillway should be kept clear of debris and plant growth which could interfere with rapid passage of waste water.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

On the basis of the Phase I visual examination, the earth embankment of the Pocantico Dam does not show any major signs of distress and in its present status, the dam is not deemed to be considered unsafe during periods of normal hydrologic conditions. Concern is given however, for the dam's safety under the condition of a severe hydrologic event. In 1977 the owner of the dam discontinued use of the site as a water supply reservoir. At the time of inspection, the dam was drawn down six feet below the spillway. Since some minor seepage has been reported in the past, it is recommended that the reservoir level be kept well below the spillway. If for some reason the reservoir level is to be raised, the dam should be inspected again under a full head with the report amended with those visual observations. A number of small trees with shallow root systems on the embankment should be removed.

Mechanical appurtenances are reportedly operable, however, are in some need of repair. Due to the status of the facility, the utility of this equipment should be evaluated in regards to a commitment to continued maintenance and repair. The dam is in the intermediate size high hazard category, and the guidelines (Ref. 1) indicates the spillway should be able to pass the Probable Maximum Flood. The spillway has been found to be seriously inadequate and is not capable of passing the 1/2 Probable Maximum Flood (PMF). The spillway is capable of passing 28 percent of the PMF.

7.2 REMEDIAL MEASURES

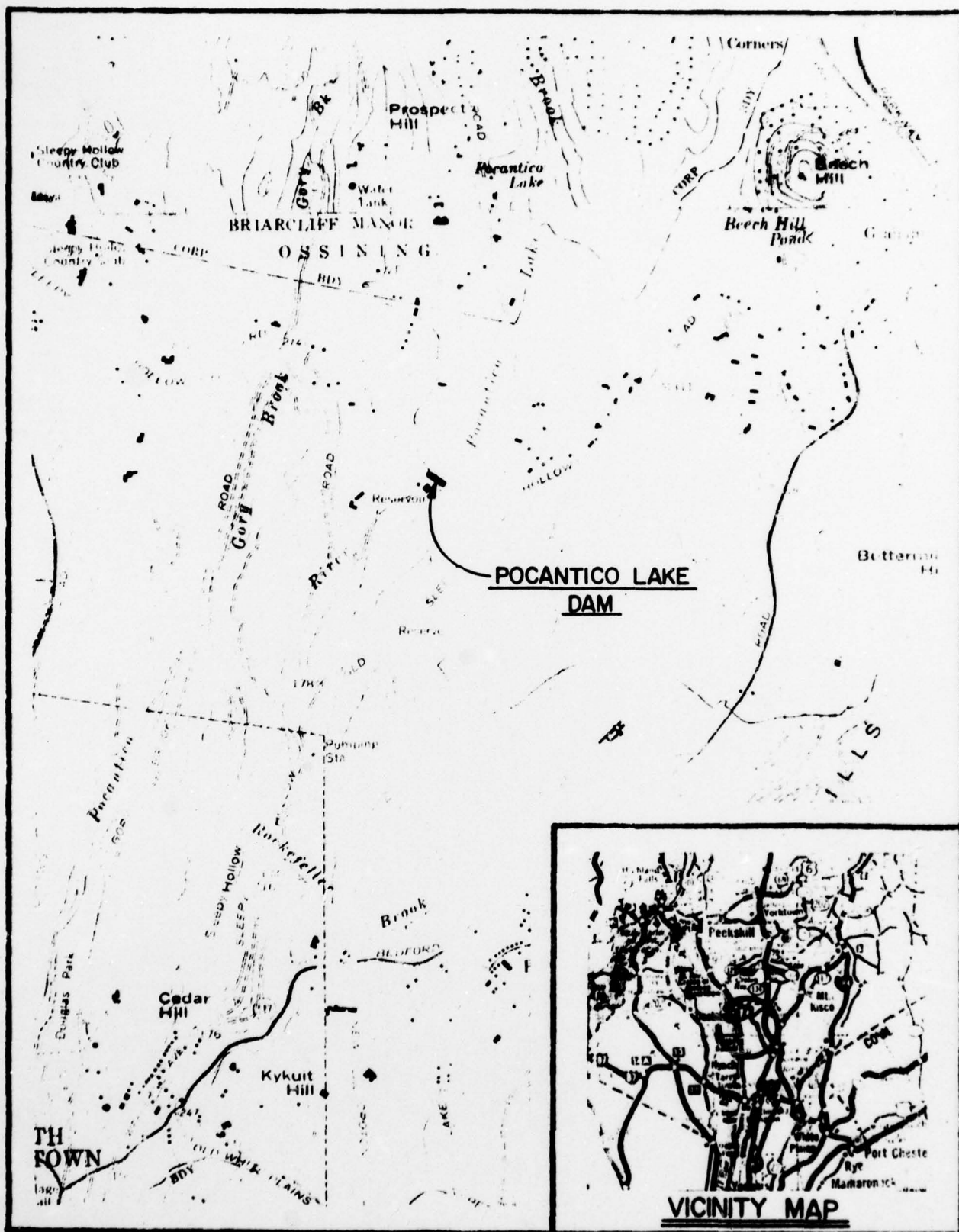
The following remedial measures are recommended.

1) Immediate Actions

The owner should continue to keep the reservoir head down at its present location and each of the sluice gates be made fully open. Since the spillway has been found to be seriously inadequate it is recommended that immediately, during periods of unusually high runoff, the owner should provide around-the-clock surveillance and have a contingency plan in the event of overtopping.

2) Further Actions to be Taken Immediately

The facility should, at a minimum, be improved to be capable of passing the 1/2 PMF. Additional engineering studies should be prepared to obtain this level of safety. The hydrologic analysis performed herein should be refined. The correct elevations of the dam should be determined, since a number of different elevations have been noted in the plans provided herein. One remedial action which should be considered, would be to have the sluice gates and their concrete frames removed to enable the spillway to pass the 1/2 PMF. As mentioned above, this alternative would have to be evaluated.



LOCATION PLAN

FIGURE 1

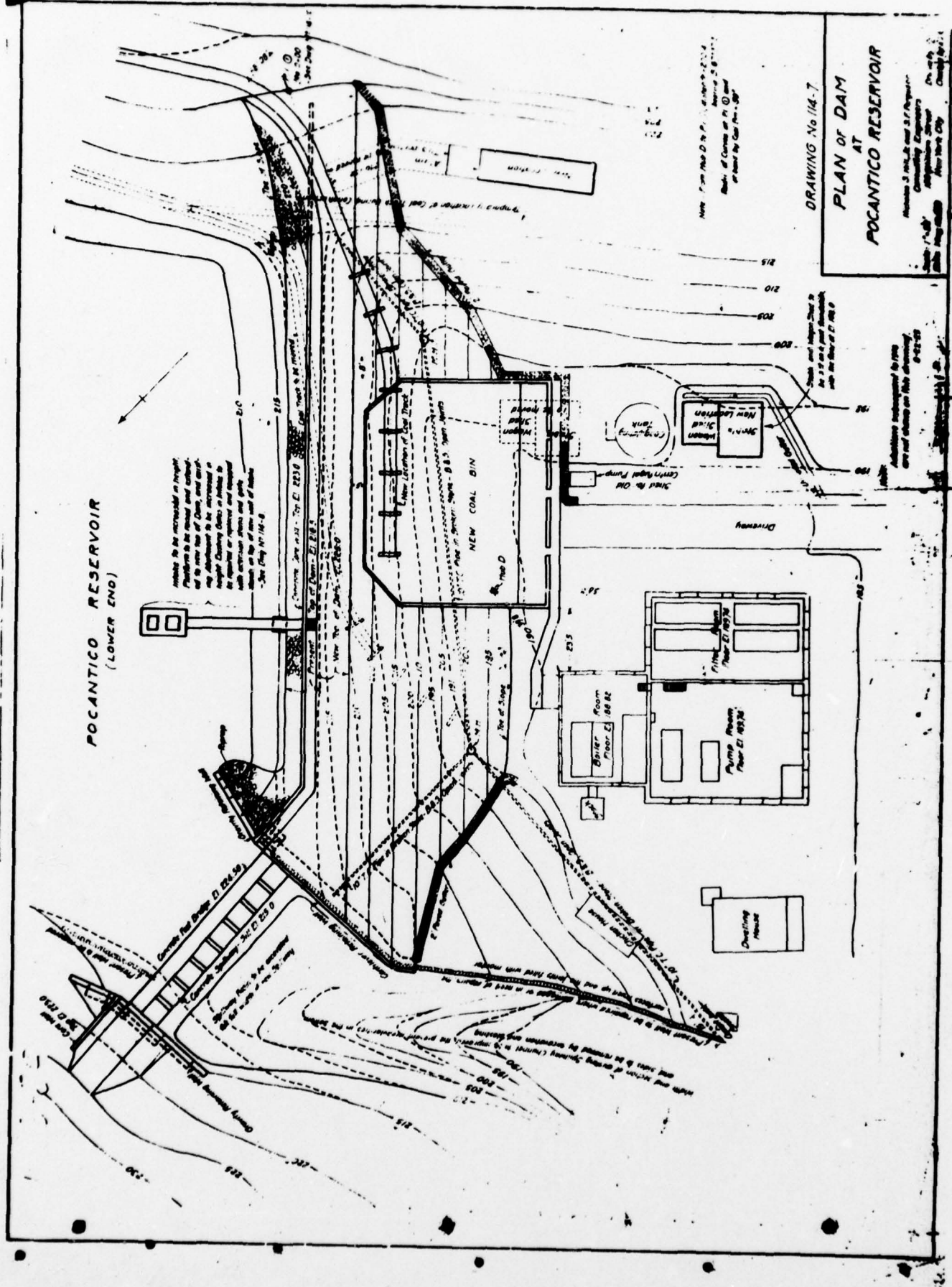
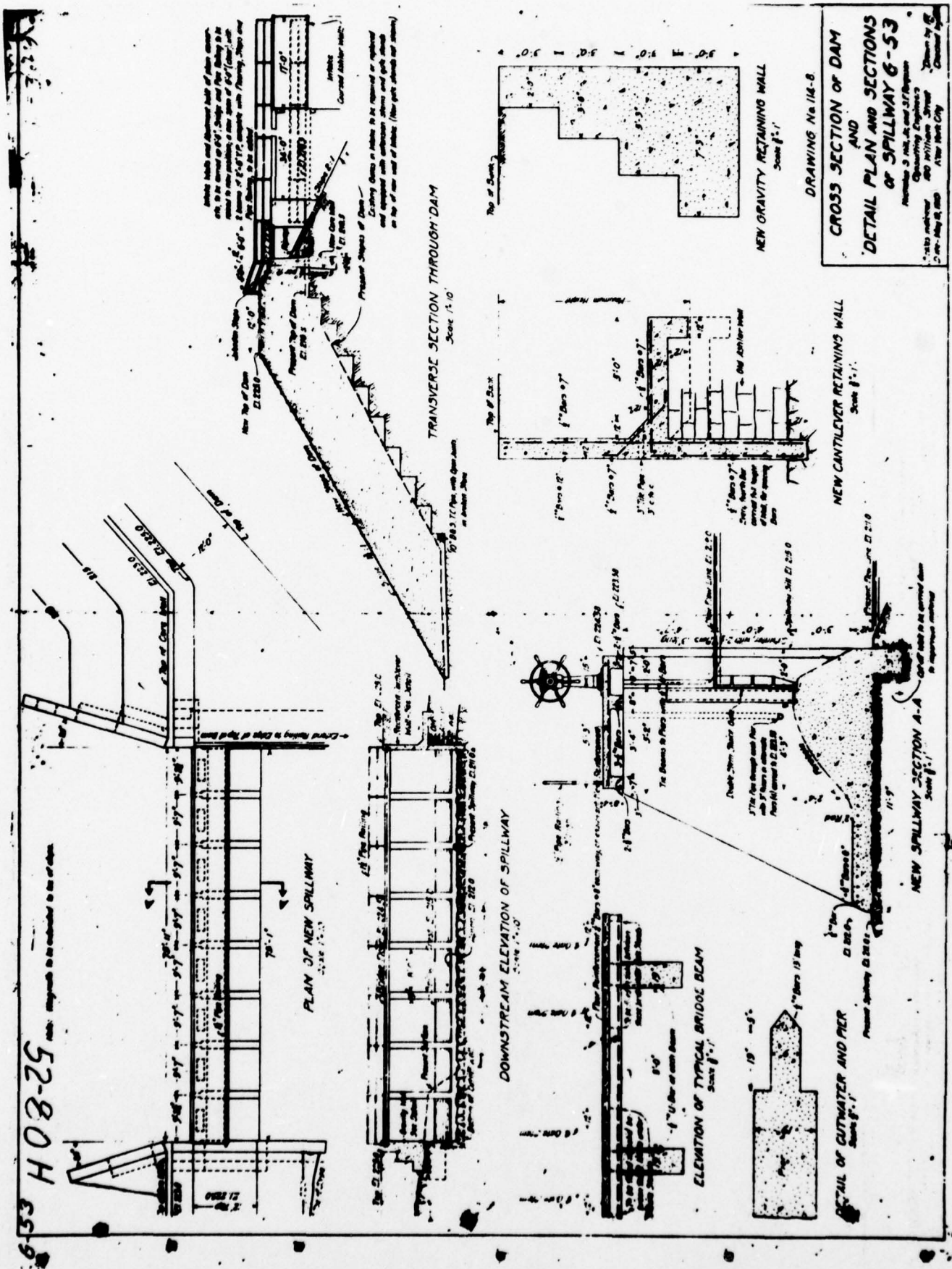


FIGURE 2



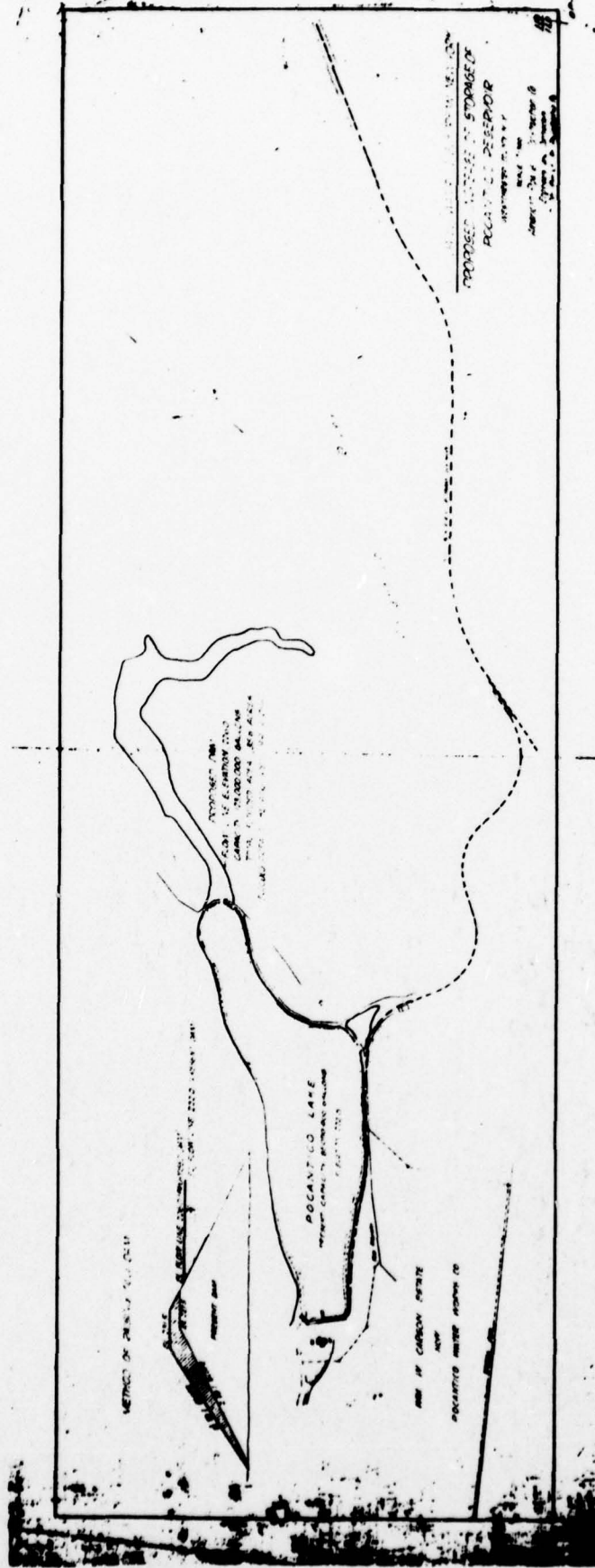


FIGURE 5

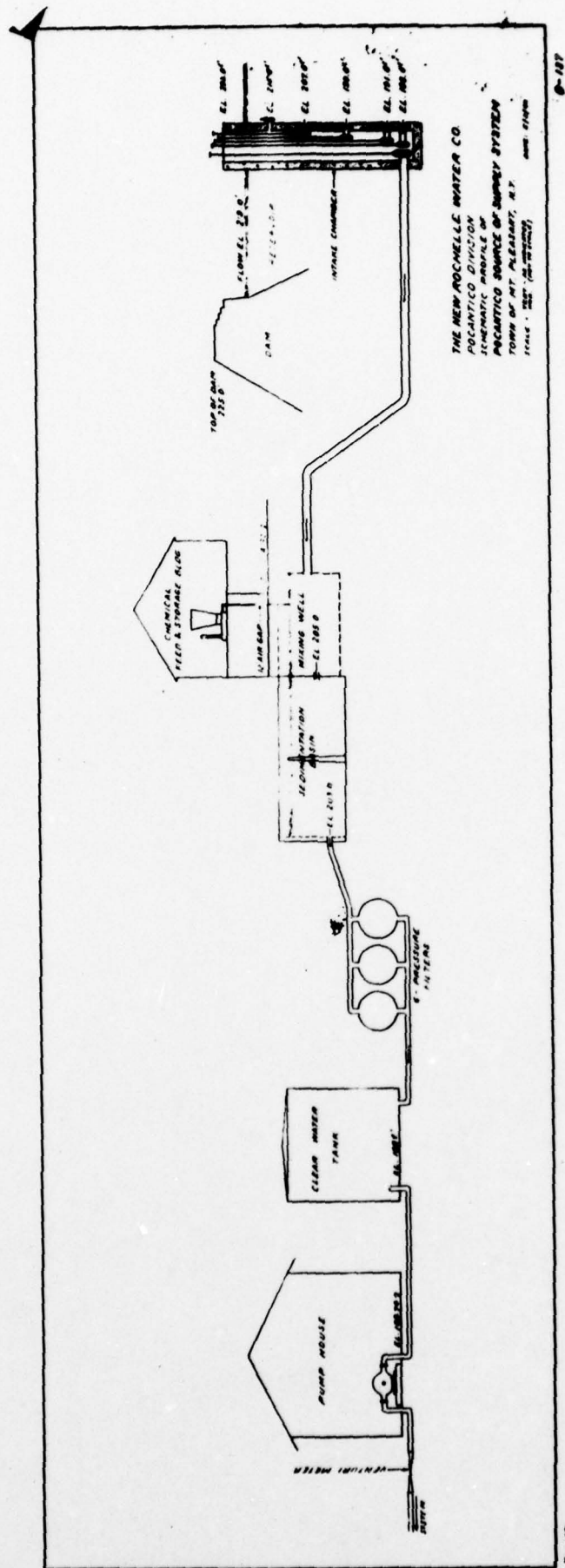


FIGURE 6

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam POCANTICO DAM County WESICHESTER State NEW YORK ID # NY 49

Type of Dam EARTHEN Hazard Category HIGH

Date(s) Inspection JULY 26, 1978 Weather SUNNY Temperature 70°

Pool Elevation at Time of Inspection 212 M.S.L. Tailwater at Time of Inspection --

Inspection Personnel:

N. F. DUNLEAVY
D. F. MCCARTHY
F. W. BYSZEWSKI
R. GAINER
P. CARROL
L. KOSILLA
G. LORENZ

DALE ENGINEERING COMPANY
DALE ENGINEERING COMPANY
DALE ENGINEERING COMPANY
NEW ROCHELLE WATER CO.
NEW ROCHELLE WATER CO.
NEW ROCHELLE WATER CO.
NEW ROCHELLE WATER CO.

N. F. DUNLEAVY Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL & HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	
STAFF GAGE OF RECORDER	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	At time of inspection, water level was 6 feet below spillway.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Minor erosion at various locations downstream face.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	No problems observed.	
RIPRAP FAILURES	None.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No problem areas observed.	
ANY NOTICEABLE SEEPAGE	Witness at toe of dam near water storage tank. A number of cattails growing. East abutment below toe next to stairs is a large cavity with some seepage. Clear water flowing.	
STAFF GAGE AND RECORDER	None.	
DRAINS	None.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None.	
APPROACH CHANNEL	None.	
DISCHARGE CHANNEL	None.	
BRIDGE AND PIERS	None.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Fair condition - no problems.	
APPROACH CHANNEL	Front of dam, reservoir surface.	
DISCHARGE CHANNEL	Good condition.	
BRIDGE AND PIERS	Fair condition - no problems.	
GATES AND OPERATION EQUIPMENT	Not well maintained. Suspect sluice gates would be very difficult to operate in case of emergency. One sluice partially open, clogged with heavy debris.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None.	
INTAKE STRUCTURE	Blow-out control rod and fastener broken; is left open. Upper sluice front of structure corroded.	
OUTLET STRUCTURE	In stream bank; discharging approxi- mately 4" deep through a 24" pipe. Drain valve or line is partially ob- structed so that the drain will not allow full pipe capacity to flow.	
OUTLET CHANNEL	Good; clear.	
EMERGENCY GATE	None.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Good condition.	
SLOPES	Relatively flat.	
APPROXIMATE NO. OF HOMES AND POPULATION	Philips Restoration below dam. Average weekly visitors to restoration - 1400 people.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	No slope above reservoir.	
SEDIMENTATION	No observed condition.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM POCANTICO
 ID # N.Y. 49

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	See this report.
CONSTRUCTION HISTORY	No data.
TYPICAL SECTIONS OF DAM	See this report.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See this report.
RAINFALL/RESERVOIR RECORDS	At Water Plant. Plant has been abandoned. Records show maximum spillway flood 27" on 10/16/55. Rainfall for 12th thru 16th was 0.0, 0.38, 2.32, 6.08, and 0.56 inches. Maximum drawdown was 238" in 11/64.

ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	None disclosed.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	See plans in this report for available data.
HIGH POOL RECORDS	27 in. over spillway in 1955.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None.
MAINTENANCE OPERATION: RECORDS	In water plant - abandoned plant.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See this report.
OPERATING EQUIPMENT PLANS & DETAILS	See this report for available data.

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 11-3/4 square miles
ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 221.77
ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 221.77
ELEVATION MAXIMUM DESIGN POOL: 225.0
ELEVATION TOP DAM: 225.0

CREST:

a. Elevation 221.77
b. Type Concrete apron with chute spillway.
c. Width -----
d. Length 75 feet tapers
e. Location Spillover West abutment
f. Number and Type of Gates (8) 8'-0" x 4'-0" sluice gates

OUTLET WORKS: (Blow out/draw down pipe)

a. Type 24" iron pipe
b. Location Intake chamber thru gate house into stream
c. Entrance Inverts 188.0 ±
d. Exit Inverts ----
e. Emergency Draindown Facilities None

HYDROMETEOROLOGICAL GATES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: ----

APPENDIX B
PREVIOUS INSPECTION REPORTS
AND CORRESPONDENCE



SLEEPY HOLLOW RESTORATIONS

RECEIVED

44 43 100

44 43 100

August 23, 1973

Mr. Neal F. Dunlevy, P.E.
Stetson, Dale
Bankers Trust Building
Utica, New York 13501

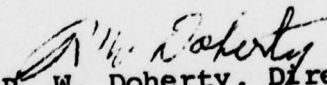
Dear Mr. Dunlevy:

It has come to my attention that you have recently been in our area doing an evaluation of the integrity of the dam of the New Rochelle Water Works Company.

We have always been concerned about the possibility of dam failure upstream from our Philipsburg Manor Restoration.

If you have any information with reference to our possible vulnerability, I would greatly appreciate it if you would share it with me.

Yours truly,


R. W. Doherty, Director
Buildings and Grounds

RWD:ab

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDO

NYNYS DE

VAN CORTLANDT MANOR

256 47
214

MEMORANDUM

On Plans for Proposed Reconstruction of Pecantico Reservoir Dam at Tarrytown, N.Y.

The plans submitted for this dam provide for the raising of the flow line by 8 ft. The present earth dam will be increased by 8.5 ft., while the spillway will be raised 4 ft. by a masonry weir, and 4 ft. additional by eight 8' x 4' sluice gates seating on the crest of the masonry weir. The drainage area at this point as planimetered from U. S. G. S. maps is 12 square miles, and our records show that in this locality a run-off of at least 240 sec. ft. per square mile, or 2880 sec. ft., should be provided for.

With gates closed, the spillway as shown on the plans will have a discharging capacity of about 2140 sec. ft., with a depth of 4.58 ft. on the crest of the spillway. With the water level at the top of the earth dam, the discharging capacity of the spillway orifices would be about 2700 sec. ft. These discharges are both less than the estimated maximum run-off, but considering the pondage effect of the storage in the reservoir above the crest of the dam the out-flow from the reservoir will be greatly reduced.

Assuming a run-off of 10 sec. ft. per square mile from the tributary watersheds to continue at that rate for three hours, and then to gradually fall to a negligible amount within five or six hours, the maximum required discharging capacity of the spillway will be only about 2000 sec. ft. with an in-flow of 2880 sec. ft. Therefore, the spillway shown on the plans may be considered safe

against the greatest flood of which we have any record in this locality. As there are no settlements in the valley of this creek between the reservoir and the Hudson river, life would not be endangered and little property damage would result from the failure of the dam.

With a depth of 4.58 ft. of water on the top of the closed gates, the dam will be stable against overturning, and if the spillway is set well down into the rock foundation it will be stable against sliding. With this depth of water the free-board of the earth section of the dam will be only 1' 4". This seems to the writer to be rather small, and the dam should be raised by at least 2 ft. Otherwise, I see no reason why the application should not be approved.

Yours very truly,


ASSISTANT ENGINEER.

To Mr. A. R. McKim,

Inspector Docks & Dams.

June 12, 1916.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

THE
NEW

bank at

N. Y.

Canal, *Conservation Corps*
Division

Percentage of Voids..... 30.6 ; Loam 3.1 ; Organic matter.....

Temperature of water used in mixing 79 Fahr. Briquettes kept in moist air 24 hours and then immersed

Sets (determined by Vicat needle): Initial, { in 19.5 min. } ; hard, { in 3.85 min. }
 { Minor requirement, 30 min. } { Requirement, 60 to 600 min. }

Fineness (per cent passing sieve of 2,500 meshes per square inch)..... 99.6 (Requirement, 99%)

" (" " " " 10,000 " " " ") 97.4 (Requirement, 92%)

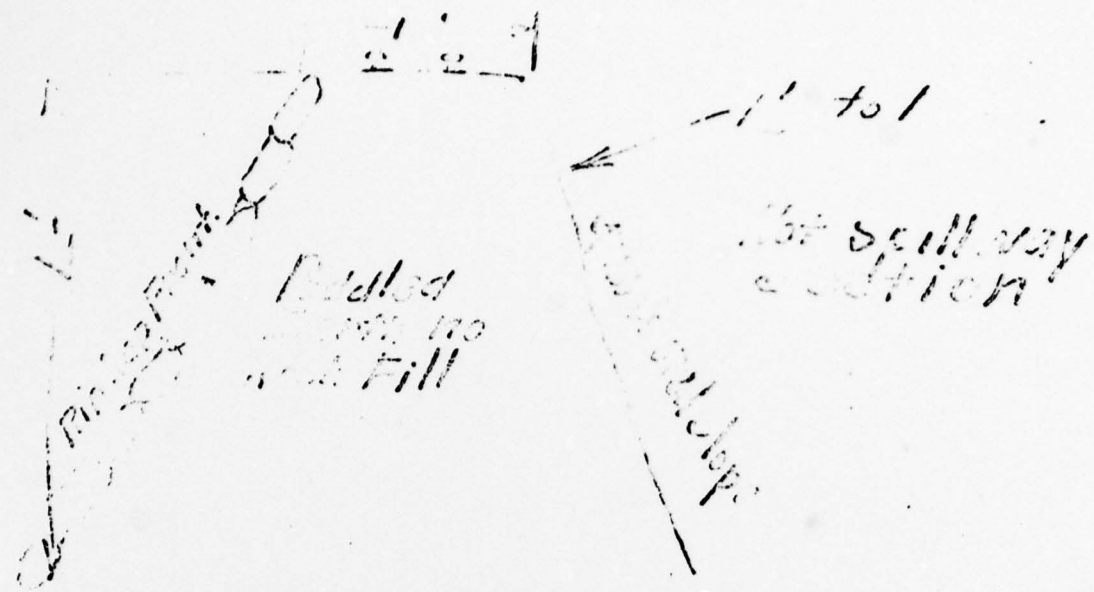
THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

! CERTIFY that this is a true & exact taken from the records of tests

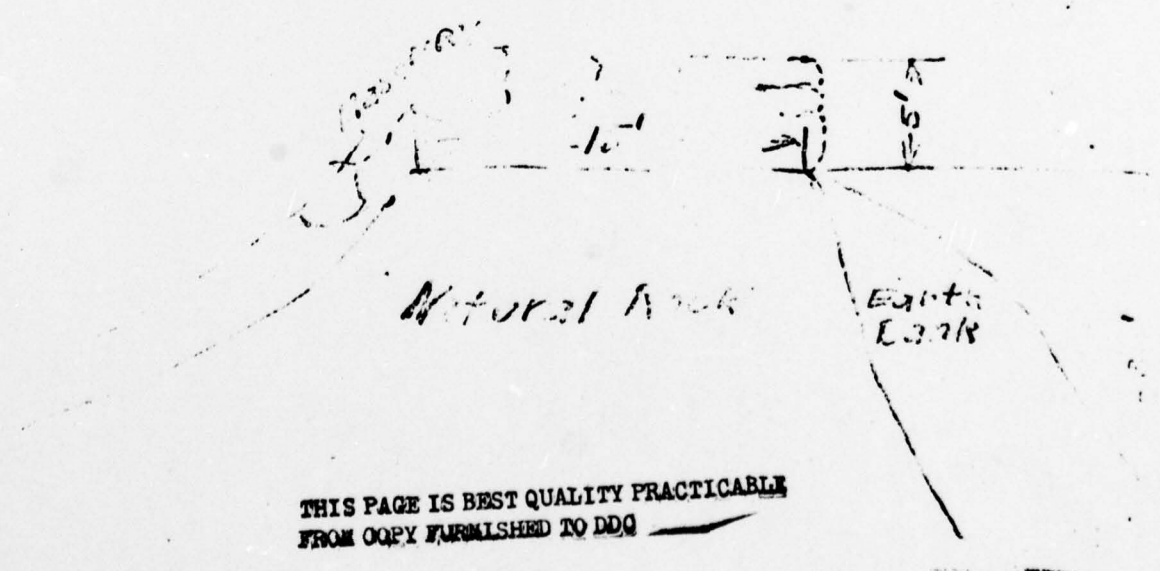
Resident Engineer in Charge of To

B-40

...the quantity of waste-water of this ...
 ...of the dam. Show particularly ...
 ...of the dam, including any at the ...



SPILLWAY SECTION



THIS PAGE IS BEST QUALITY PRACTICABLE
 FROM COPY FURNISHED TO DDG

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

Handwritten notes:
To [unclear]
[unclear]

Pocuntico Lake

← 3 MILES →

PUTNAM DIV OF N.Y.C.



S. 111 TO C. ROAD

SUBJECT Pocahontas Reservoir
Investigation of Dam

FILE NO. 1372-1-111
ACC. NO. 6-2217
SHEET 2

APR 24

COMPUTER St. June 8 1966 CHECKED BY of Martin June 9 1966

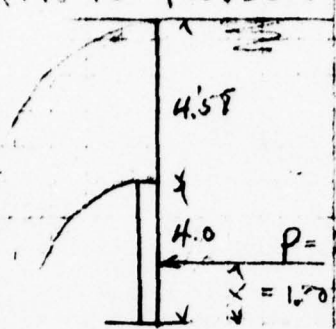
MADE IN CONNECTION WITH

REFERENCE

COPY'S FROM ACC. 6-2216

Stability about joint at top of spillway sill - El. 215

(No ice pressure - no uplift, by d.)



$M_o = P_x$

$P = \gamma (4.58 + 7.58) \times 4 = 1645 \text{ lb/lin.ft.}$

$x = \frac{8.58^2 + 8.58 \times 4.58 - 2 \times 4.58^2}{3(8.58 + 4.58)} = 1.79$

$M_o = 1645 \times 1.79 = 2960 \text{ lb/lin.ft.}$

Overturning moment per section 9-7"

$M_o = 2960 \times 9.58 = 28300 \text{ lb}$

Resisting Moment

THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDC

Water	$1.0 \times 2.58 \times 1.58 \times 144 \times 4 \times \frac{1}{2}$	$= 10400$
	$5.17 \times 8.58 \times 1.58 \times 144 \times (4 + \frac{6.58}{2})$	$= 66500$
	$1.15 \times 8.58 \times .75 \times 144 \times (\frac{10.05}{2} + \frac{1}{2})$	$= 16300$
Fill	$6.6 \times .33 \times 9.58 \times 144 \times 7.2$	$= 21400$
	$.67 \times .58 \times 9.58 \times 144 \times 4.6$	$= 4100$
	$.67 \times .67 \times 9.58 \times 144 \times 8.6$	$= 3100$
	$.67 \times .58 \times 9.68 \times 144 \times 10.5$	$= 700$

M_r

$= 123000 \text{ lb}$ (wt. of gates and standards not considered)

Out. of gates over turning

Sliding: $H_o = P = 1645 \times 9.58 = 15750 \text{ lb}$

$V_k = 20260$

$f = \frac{15750}{20260} = 0.78$ (must be reinforced)

Shear $= \frac{15750}{(1.58 \times 9.17 + .75 \times 17.5) 144} = 7 \text{ sq in OK}$

SUBJECT Kocantico Reservoir Investigation of proposed dam

FILE NO. D-500-4-11

ACC. NO. C-2216

SHEET 1

COMPUTER J. H. Cullings, June 7, 1916 CHECKED BY S. H. Hunter, June 9, 1916

MADE IN CONNECTION WITH

REFERENCE Plans submitted by H. H. Ferguson

COPY'S FROM ACC.

Drainage area - stated to be 12.1 sq. mi. (12.2 sq. mi. from U.S.G.S.)

Discharging capacity required by curve Reg. G. 1618, = 240 cfs.

$$12.1 \times 240 = 2900 \text{ sec. ft.} \checkmark$$

Spillway - 68 ft long - 8-8 ft. spaces. \checkmark

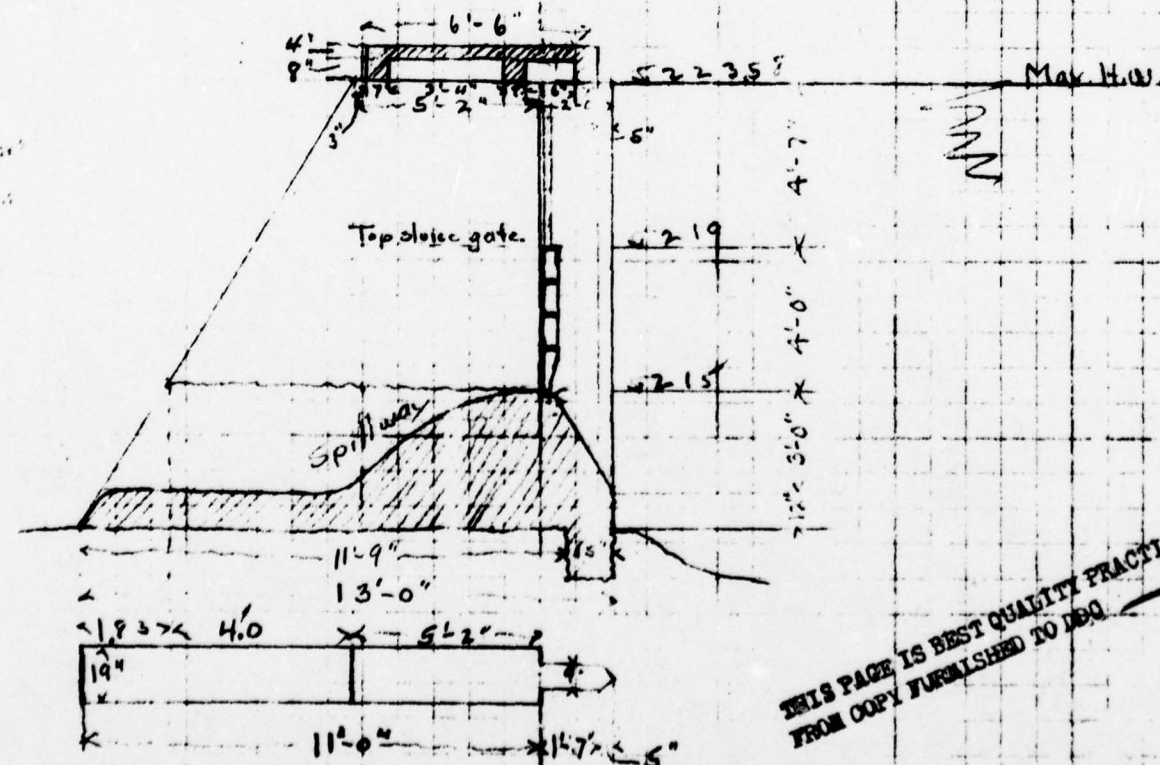
Proposed flow line, 219.0 = Top of gates (closed) \checkmark

Present ^{sill} flow line 215.0 \checkmark

With sluice gates closed, flood discharge area is limited to 8 ft wide and 4.5 ft high. \checkmark

$$\begin{aligned} \text{Discharging capacity} &= 64 \times 3.33 \times 4.5^{\frac{3}{2}} = 2100 \text{ cfs.} \checkmark \\ &= 173 \text{ cfs./sq. mi.} \checkmark \end{aligned}$$

Rather low for this locality.



THIS PAGE IS BEST QUALITY PRACTICABLE
 FROM COPY FURNISHED TO DBO

SUBJECT Pocantico Reservoir
Investigation of Dam

FILE NO. 6-22-19

ACC. NO. 6-22-19

SHEET 3

COMPUTER HE

App# 240

CHECKED BY Maclean

10 1916

MADE IN CONNECTION WITH

REFERENCE

COPY'S FROM 6-2-17

Load along base

$$M_o = \frac{62.5}{6} (12.58^{6.4} - 4.5) (12.58^{2.114} + 2 \times 9.16^{9.16}) = 14400' \checkmark$$

$$M_o = 14400 \times 9.58 = 138,000' \checkmark$$

$$M_r = (\text{Proc. 6-22-17}) = 128,000' \checkmark$$

$$+ 9.17 \times 4.0 \times 1.57 \times 144 \times (1.75 + \frac{9.17}{2}) = 53,500' \checkmark$$

$$+ 1.75 \times 4.0 \times .75 \times 144 \times (11.0 + \frac{1.75}{2}) = 9,600' \checkmark$$

cap. lines (approx)

$$+ 7 \times 3 \times 8 \times 144 \times 9.58 = 230,000' \checkmark$$

Total M_r

$$421,100' \checkmark$$

OK \checkmark

Sliding

$$H_o = P = 8 (12.58^{4.0} - 4.5) \times 7.0 \times 9.58 = 41,300' \checkmark$$

$$V_L = 2,1260 + 7350 + 810 - 2,1200 + 10510 = 64120' \checkmark$$

water surface

$$62.5 \times 2.2 (2.58^{2.016} + 1.57) \times 8 = 10200' \checkmark$$

Gates, wt, say 8000' ch.

$$\frac{8000}{82320}$$

$$f = \frac{41300}{82320} = 0.5 \quad \text{C.K.} \checkmark$$

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDG

SUBJECT Pocantico Reservoir
Investigation of Dam

FILE NO. 6-221E

ACC. NO. 6-221E

APP # 240

SHEET 1

COMPUTER Stallings June 9 1916 CHECKED BY June 1 1916

MADE IN CONNECTION WITH

REFERENCE

COPY FROM ACC. 6-221E

Spillway

Area present reservoir (211.0) = 25 acres
 " proposed " (219.0) = 90 "

(Report of Will Fergus)

211.0

1,090,000

219.0

3,192,000

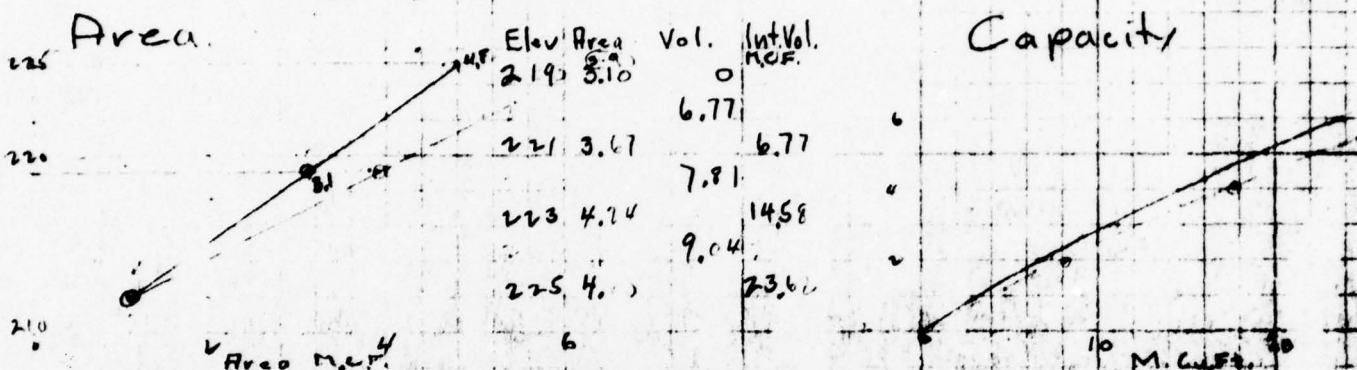
225.0

(Top dam) (estimated) 4,600,000

23,000,000

in ft. capacity between
 top of gates and top of dam.

Assumed Capacity Curve of Res.



Assumptions as to rainfall and run off.

Drainage Area - 12 sq. mi.

Max. distance from dam 6 mi.

Velocity of flow in creek 5 ft/sec.

Time of max. concentration, 105 min, say 2 hr.

Rainfall - max. rainfall, 6 in. in 3 hr. (Acc. E. 2810)

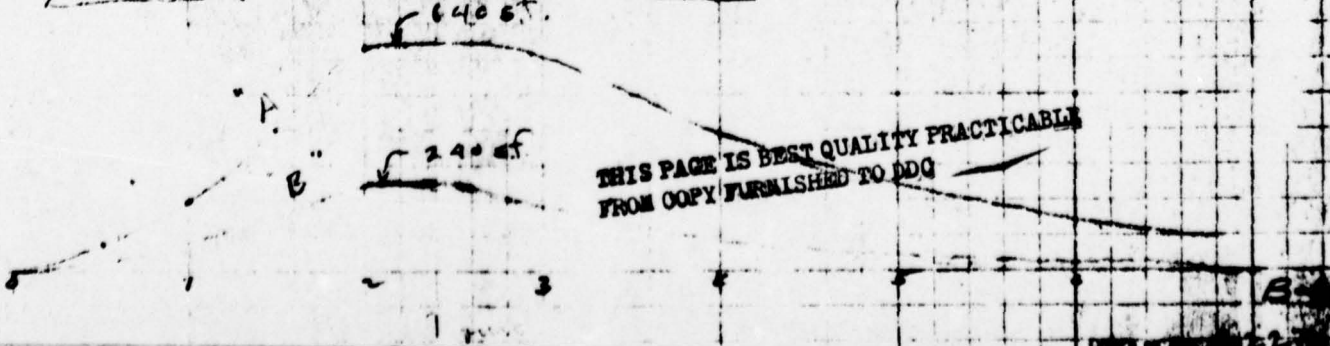
Run-off, 50% = 3 in. in 3 hr. = 1 in. per hr.

Max. rate of run-off - at end of 2 hr. =

$$\frac{12 \times 27,000,000 \times 1}{3600 \times 12} = 7700 \text{ sec. ft.}$$

$$= 640 \text{ sec. ft. / sq. mi.}$$

Hydrograph of assumed run-off.



THIS PAGE IS BEST QUALITY PRACTICABLE
 FROM COPY FURNISHED TO DDG

SUBJECT Pocantico Reservoir
Investigation of Dam

FILE NO. 6-2269

ACC. NO. 6-2270

COMPUTER TE June 9 19 6

CHECKED BY J. M. Martin June 11 19 6

MADE IN CONNECTION WITH

REFERENCE

COPY'S FROM ACC. 6-2269

Pondage effect on rate of spillway discharge

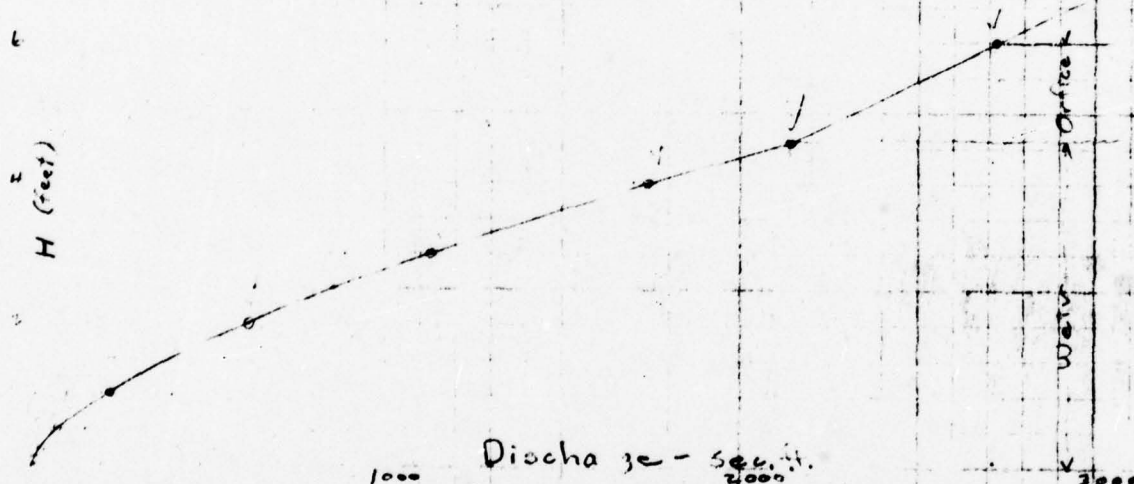
Spillway discharge computed from: $Q = 3.4 L H^{3/2}$, $L = 64$

H = 0.1	Q = 6.54 c.f.s.	✓
= 0.2	19	✓
= 0.5	76	✓
1.0	218	✓
2.0	610	✓
3.0	1130	✓
4.0	1740	✓
4.5	2140	✓

$$Q = 40.1 \cdot 1296, (h = 6.0 - 2.2 = 3.8) (C = 4.58 \times 8 \times 8 \times 0.6 \times 1.64 \times 3.81) \checkmark$$

$$H = 6.0 \quad 2720 \checkmark$$

Curve showing rate of spillway discharge



THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDG

SUBJECT Pacantico Reservoir
Investigation of Dam

FILE NO. 4-2271

ASS. NO. C-2271

APP # 240

SHEET 6

COMPUTER E/C

June 9 1916

CHECKED BY J. Mantica June 12 1916

MADE IN CONNECTION WITH

REFERENCE

OSR'S FORM No. C-2271

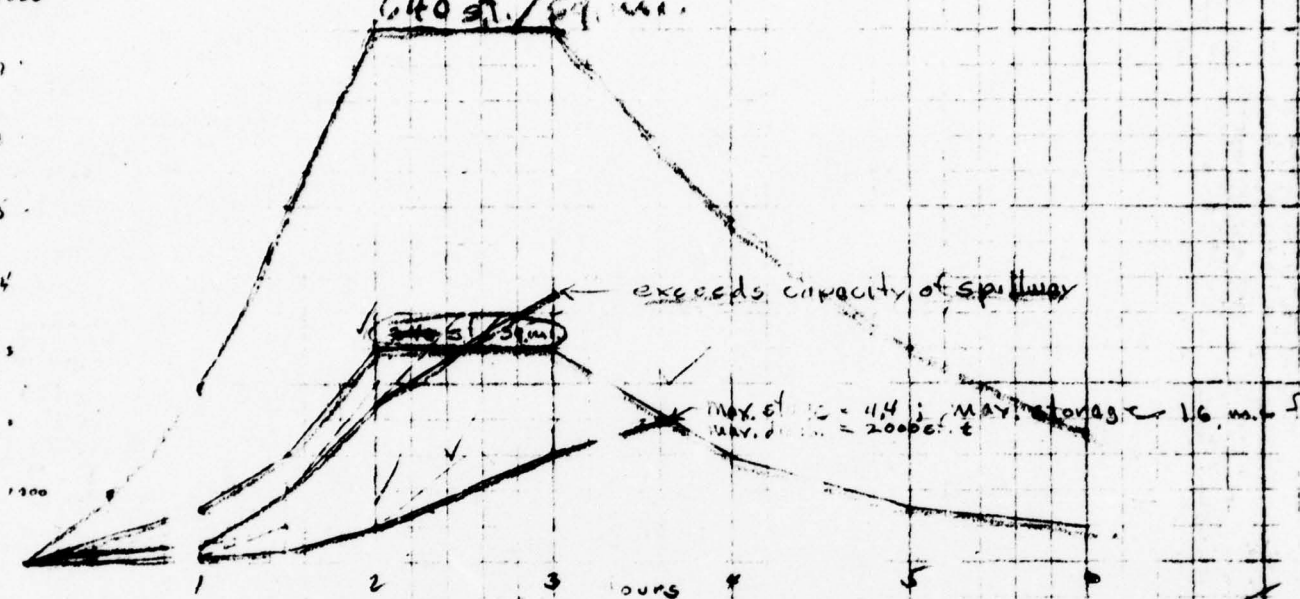
Assuming Max. Flood of 140 cfs/sq. mi. (7680 cfs) at end of 2 hrs

Hydrograph of assumed in-lake (Curve 'A') Acc. C-2269

7000

140 cfs/sq. mi.

Flow - Thousand cfs

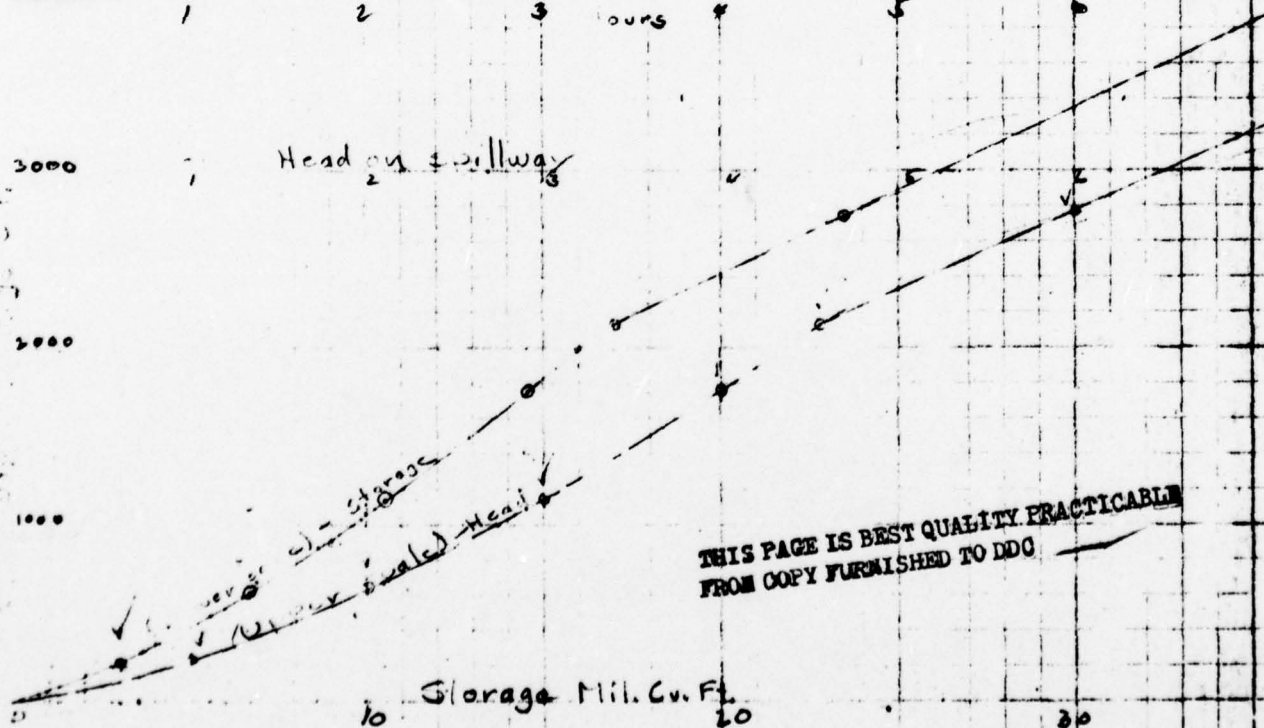


3000

Head on spillway

2000

1000



THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

July 22, 1948.

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

DALETHIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC**DESIGN BRIEF**DESIGNED BY JP6DATE 8-7-78

CHECKED BY _____

PAGE C-1 OF _____PROJECT NO. 2210SHORT TITLE NY DAM INSPECTIONSMAIN SUBJECT POCANTICO LAKE DAM

REF. DWGS. _____

ESTIMATE OF CLARK'S PARAMETERESTIMATE OF T_C (BPR)

$$T_C = (11.9 L^{3/4})^{.385} = (11.9 (5.114)^{3/4})^{.385} = 1.62 \text{ HR}$$

SCS

$$L = \frac{2.8 (341)^7}{1900 Y^{.5}} = \frac{(27000)^{.8} (3.85 \cdot 1)^7}{1900 (1.5)^{.5}}$$

$$S = 1000 - 10 = 309$$

CU

$$= \frac{10656.319}{2327.015} = 4.579$$

$$T_C = L/.6 = 4.579/.6 = 7.63 \text{ HR}$$

NORTH ATLANTIC DIV WATER RESOURCES STUDY (FEB 72)

$$(T_C + R) = 10 (a) (DA/S)^{.5}$$

$$= 10 (.82) (10.402/21)^{.25} = 15.30$$

$$R/(T_C + R) = .39$$

$$R/(5.30) = .39$$

$$R = 5.97$$

$$5.97/(T_C + 5.97) = .39$$

$$5.97 = .39 (T_C + 5.97)$$

$$5.97 = .39 T_C + 2.33$$

$$9.93 = T_C$$

DALETHIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC**DESIGN BRIEF**

DESIGNED BY _____

DATE _____

CHECKED BY _____

PAGE C-2 OF _____PROJECT NO. 2210SHORT TITLE NY DAM INSPECTIONDESIGN SUBJECT POCANTICO LAKE DAM

REF. DWGS. _____

ESTIMATE OF SNYDER'S PARAMETERS

640 $C_p =$

$C_p = 0.625$

$C_T = 1.2$ assumed

$t_p = C_T (L \times L_{ca})^{0.3}$

$t_p = 1.2 (5.1 \times 2.6)^{0.3}$

$t_p = 2.6$

$t_r = t_p / 5.5 = .47$

$t_{pr} = t_p + 0.25(t_r - t_p)$

$t_{pr} = 2.6 + 0.25(0.5)$

$t_{pr} = 2.73$

SUMMARY OF PARAMETERSCLARK'S

BPR

SCS (CN METHOD)

NORTH ATLANTIC DIV

$T_c = 1.65 \text{ hrs}$

$T_c = 7.63 \text{ hrs } R = 4.98$

$T_c = 9.53 \text{ hrs } R = 5.97$

SUNDER'S

$t_{pr} = 2.73$

$C_p = 0.625$

$R / (T_c + R) = 0.39$

DALETHIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDG**DESIGN BRIEF**

DESIGNED BY _____

DATE _____

CHECKED BY _____

PAGE L-3 OF _____PROJECT NO. 2210SHORT TITLE NY DAM INSPECTIONSDESIGN SUBJECT POCANTICO LAKE DAM

REF. DWGS. _____

D-A-D - RELATIONSHIPSDURATIONDEPTH% OF INDEX

6 HR	25.0	107
12 HR	29.	122
24 HR	32.	137
48 HR	36.	151
72 HR	38.3	159

$$\frac{\text{Ind. Loss}}{240} = \frac{1.11}{1.0}$$

BASE FLOW

$$2 \text{ cfs} = 1.9 \text{ in.} = 21 \text{ ft}$$

LOSS RATES

$$\begin{aligned} \text{INITIAL LOSS} &= 1.0 \\ \text{CONSTANT LOSS} &= 0.5 \end{aligned}$$

DALE

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDO

DESIGN BRIEF

DESIGNED BY _____

DATE _____

CHECKED BY _____

PAGE C-4 OF _____

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT _____ REF. DWGS. _____

SUMMARY OF CALCULATIONS

SPF Clarks Parameters
 Snyder's "

Tc 27.63, R 4.48
Tc F 3.63 R 2.19

Peak

6831
11400

PMF Clarks Parameters
 Snyder's Parameters

14000
23500

UNIT GRAPH AND HYDROGRAPH COMP JULY 1966 (REVISED AUGUST 1974)
HYDROLOGIC ENGINEERING CENTER (HEC)
DAVIS, CA

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

--- OPERATIONS AVAILABLE ---

TIME INT = SET TIME INTERVAL OF ALL COMPUTATIONS
UNIT H = COMPUTE UH BY INPUT, CLARK, OR SNYDER
RAIN = INPUT RAIN AND LOSS RATE DATA
RUNOFF = INPUT BASEFLOW, COMPUTE & PRINT HYDROGRAPH
PNT = PRINT UNIT HYDROGRAPH ONLY
STOP = STOP EXECUTION OF PROGRAM

USER MUST SELECT OPERATION DESIRED
MAY RETURN TO ANY OPERATION

SELECT 1-6 (1=TIME INT, 2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, '6=STOP) 1
ENTER TIME INTERVAL (MIN) = 60.

SELECT 1-6 (1=TIME INT, 2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, '6=STOP) 2
ENTER DRAINAGE AREA (SQMI) = 10.50
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER) 2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE) = 0
ENTER CLARKS TC AND R (HRS) = 7.63 4.88

TH	CP	TC	R
6.35	0.683	7.63	4.88

SELECT 1-6 (1=TIME INT, 2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, '6=STOP) 3
ENTER RATIO IMPERVIOUS = 0.00
SELECT 1-3 (1=RAIN, 2=SPS, 3=PE) 2
ENTER SPS INDEX RAINFALL (IN) = 12.00
ENTER TRSPC AND TRSDA (SQMI) = 1.00 10.50
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS) 1
ENTER INITIAL LOSS (IN), CONSTANT LOSS (IN/HR) = 1.00 0.10

SELECT 1-6 (1=TIME INT, 2=UNIT H, 3=RAIN, 4=RUNOFF, 5=PNT, '6=STOP) 4
ENTER A TITLE PLEASE - POCANTICO SPR
ENTER STARTQ, QRCN, AND RTIOR = 21.00 21.00 1.00

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.00	0.00	0.00	42.	21.	21.
2	0	0.00	0.00	0.00	154.	21.	21.
3	0	0.00	0.00	0.00	303.	21.	21.
4	0	0.00	0.00	0.00	465.	21.	21.
5	0	0.00	0.00	0.00	608.	21.	21.
6	0	0.00	0.00	0.00	699.	21.	21.
7	0	0.01	0.01	0.00	729.	21.	21.
8	0	0.01	0.01	0.00	621.	21.	21.
9	0	0.01	0.01	0.00	570.	21.	21.
10	0	0.01	0.01	0.00	469.	21.	21.
11	0	0.01	0.01	0.00	382.	21.	21.
12	0	0.01	0.01	0.00	311.	21.	21.
13	0	0.03	0.03	0.00	255.	21.	21.

C-5

80	0	0.02	0.02	0.00	21.	1331.
81	0	0.02	0.02	0.00	21.	1089.
82	0	0.02	0.02	0.00	21.	891.
83	0	0.02	0.02	0.00	21.	730.
84	0	0.02	0.02	0.00	21.	599.
85	0	0.05	0.05	0.00	21.	493.
86	0	0.06	0.06	0.00	21.	405.
87	0	0.08	0.08	0.00	21.	333.
88	0	0.20	0.10	0.10	21.	279.
89	0	0.07	0.07	0.00	21.	243.
90	0	0.06	0.06	0.00	21.	219.
91	0	0.01	0.01	0.00	21.	204.
92	0	0.01	0.01	0.00	21.	189.
93	0	0.01	0.01	0.00	21.	173.
94	0	0.01	0.01	0.00	21.	153.
95	0	0.01	0.01	0.00	21.	117.
96	0	0.01	0.01	0.00	21.	94.
97	0				21.	75.
98	0				21.	64.
99	0				21.	56.
100	0				21.	49.
101	0				21.	43.
102	0				21.	38.
103	0				21.	35.
104	0				21.	32.
105	0				21.	30.
106	0				21.	28.
107	0				21.	27.
108	0				21.	26.
109	0				21.	25.
110	0				21.	24.
111	0				21.	24.
112	0				21.	23.
113	0				21.	23.
114	0				21.	22.
115	0				21.	22.
116	0				21.	22.
117	0				21.	22.
118	0				21.	22.
119	0				21.	21.
120	0				21.	21.
121	0				21.	21.
122	0				21.	21.
123	0				21.	21.
124	0				21.	21.
125	0				21.	21.
126	0				21.	21.
TOTAL		17.16	4.70	12.46	6700.	2646. 86877.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDO

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 1
 ENTER TIME INTERVAL(MIN)= 60.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 2
 ENTER DRAINAGE AREA (SQMI) = 10.50
 SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER) 3
 ENTER SNYDERS CP AND TP (HRS) = 0.62 2.73
 ENTER INITIAL EST. CLARKS TO & (HRS) (0=DEFAULT)= 0.00 0.00

TP	CP	TC	R
2.39	0.586	3.12	2.05
2.64	0.647	3.23	2.12
2.71	0.639	3.23	2.17
2.72	0.633	3.23	2.19
2.72	0.630	3.23	2.19

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 3
 ENTER RATIO IMPERVIOUS = 0.00
 SELECT 1-3 (1=RAIN, 2=SPS, 3=PMS) 2
 ENTER SPS INDEX RAINFALL (IN) = 12.00
 ENTER TRFC AND TRSDA (SQMI) = 1.00 10.50
 SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS) 1
 ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) = 1.00 0.10

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 4
 ENTER A TITLE PLEASE - POCANTICO SPF
 ENTER STATQ,QRC SN,AND RTIOR = 21.00 21.00 1.00

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.00	0.00	0.00	306.	21.	21.
2	0	0.00	0.00	0.00	103.	21.	21.
3	0	0.00	0.00	0.00	156.	21.	21.
4	0	0.00	0.00	0.00	140.	21.	21.
5	0	0.00	0.00	0.00	91.	21.	21.
6	0	0.00	0.00	0.00	57.	21.	21.
7	0	0.01	0.01	0.00	36.	21.	21.
8	0	0.01	0.01	0.00	22.	21.	21.
9	0	0.01	0.01	0.00	143.	21.	21.
10	0	0.01	0.01	0.00	90.	21.	21.
11	0	0.01	0.01	0.00	57.	21.	21.
12	0	0.01	0.01	0.00	30.	21.	21.
13	0	0.03	0.03	0.00	23.	21.	21.
14	0	0.04	0.04	0.00	15.	21.	21.
15	0	0.05	0.05	0.00		21.	21.
16	0	0.12	0.12	0.00		21.	21.
17	0	0.04	0.04	0.00		21.	21.
18	0	0.03	0.03	0.00		21.	21.
19	0	0.01	0.01	0.00		21.	21.

[illegible]

C-9

73	0	0.01	0.01	0.00	21.	1522.
74	0	0.01	0.01	0.00	21.	1101.
75	0	0.01	0.01	0.00	21.	738.
76	0	0.01	0.01	0.00	21.	467.
77	0	0.01	0.01	0.00	21.	289.
78	0	0.01	0.01	0.00	21.	156.
79	0	0.02	0.02	0.00	21.	94.
80	0	0.02	0.02	0.00	21.	57.
81	0	0.02	0.02	0.00	21.	43.
82	0	0.02	0.02	0.00	21.	34.
83	0	0.02	0.02	0.00	21.	28.
84	0	0.02	0.02	0.00	21.	25.
85	0	0.05	0.05	0.00	21.	22.
86	0	0.06	0.06	0.00	21.	21.
87	0	0.08	0.08	0.00	21.	21.
88	0	0.20	0.10	0.10	21.	52.
89	0	0.07	0.07	0.00	21.	124.
90	0	0.06	0.06	0.00	21.	178.
91	0	0.01	0.01	0.00	21.	161.
92	0	0.01	0.01	0.00	21.	113.
93	0	0.01	0.01	0.00	21.	79.
94	0	0.01	0.01	0.00	21.	57.
95	0	0.01	0.01	0.00	21.	44.
96	0	0.01	0.01	0.00	21.	35.
97	0				21.	30.
98	0				21.	27.
99	0				21.	25.
100	0				21.	23.
101	0				21.	22.
102	0				21.	21.
103	0				21.	21.
104	0				21.	21.
105	0				21.	21.
106	0				21.	21.
107	0				21.	21.
108	0				21.	21.
109	0				21.	21.
TOTAL		17.16	4.70	12.46	675.	2289. 86459.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDG

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 1
 ENTER TIME INTERVAL(MIN)= 60.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 2
 ENTER DRAINAGE AREA (SQMI) = 10.50
 SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER) 3
 ENTER SNYDERS CP AND TP (HRS) = 0.62 2.73
 ENTER INITIAL EST. CLARKS TO % (HRS) (0=DEFAULT)= 0.00 0.00

TP	CP	TC	R
2.39	0.586	3.12	2.05
2.64	0.647	3.23	2.12
2.71	0.639	3.23	2.17
2.72	0.633	3.23	2.19
2.72	0.630	3.23	2.19

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 3
 ENTER RATIO IMPERVIOUS = 0.00
 SELECT 1-3 (1=RAIN, 2=SIS, 3=PMS) 3
 ENTER PMS INDEX RAINFALL (IN) = 24.00
 ENTER R6,R12,R24,R48,R72,R96 = 107.00 122.00 137.00 151.00 159.00
 ENTER TRSFC AND TRSDA (SQMI) = 0.00 10.50
 SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS) 1
 ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) = 1.00 0.10

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 4
 ENTER A TITLE PLEASE - POCANTI PMF
 ENTER ST10,ORCSN,AND RTTOR = 21.0 21.00 1.00

HR	MIN	RAIN	LOSS	EXCESS	UNIT	MG	RECSN	FLOW
1	0	0.02	0.02	0.00	30	.	21.	21.
2	0	0.02	0.02	0.00	103	.	21.	21.
3	0	0.02	0.02	0.00	156	.	21.	21.
4	0	0.02	0.02	0.00	140	.	21.	21.
5	0	0.02	0.02	0.00	91	.	21.	21.
6	0	0.02	0.02	0.00	57	.	21.	21.
7	0	0.05	0.05	0.00	36	.	21.	21.
8	0	0.05	0.05	0.00	22	.	21.	21.
9	0	0.05	0.05	0.00	14	.	21.	21.
10	0	0.05	0.05	0.00	9	.	21.	21.
11	0	0.05	0.05	0.00	57	.	21.	21.
12	0	0.05	0.05	0.00	36	.	21.	21.
13	0	0.21	0.21	0.00	23	.	21.	21.
14	0	0.25	0.25	0.00	1	.	21.	21.
15	0	0.32	0.18	0.14			21.	64.
16	0	0.80	0.10	0.70			21.	380.
17	0	1.29	0.10	0.19			21.	1021.
18	0	0.23	0.10	0.13			21.	1550.
19	0	0.03	0.03	0.00			21.	1563.
20	0	0.03	0.03	0.00			21.	1213.

THIS PAGE IS BEST QUALITY PRACTICABLE
 FROM COPY FURNISHED TO DDG

21	0	0.03	0.03	0.00
22	0	0.03	0.03	0.00
23	0	0.03	0.03	0.00
24	0	0.03	0.03	0.00
25	0	0.19	0.10	0.09
26	0	0.19	0.10	0.09
27	0	0.19	0.10	0.09
28	0	0.19	0.10	0.09
29	0	0.19	0.10	0.09
30	0	0.19	0.10	0.09
31	0	0.48	0.10	0.38
32	0	0.48	0.10	0.38
33	0	0.48	0.10	0.38
34	0	0.48	0.10	0.38
35	0	0.48	0.10	0.38
36	0	0.48	0.10	0.38
37	0	2.06	0.10	1.96
38	0	2.47	0.10	2.37
39	0	3.09	0.10	2.99
40	0	7.82	0.10	7.72
41	0	2.88	0.10	2.78
42	0	2.26	0.10	2.16
43	0	0.29	0.10	0.19
44	0	0.29	0.10	0.19
45	0	0.29	0.10	0.19
46	0	0.29	0.10	0.19
47	0	0.29	0.10	0.19
48	0	0.29	0.10	0.19
49	0	0.01	0.01	0.00
50	0	0.01	0.01	0.00
51	0	0.01	0.01	0.00
52	0	0.01	0.01	0.00
53	0	0.01	0.01	0.00
54	0	0.01	0.01	0.00
55	0	0.03	0.03	0.00
56	0	0.03	0.03	0.00
57	0	0.03	0.03	0.00
58	0	0.03	0.03	0.00
59	0	0.03	0.03	0.00
60	0	0.03	0.03	0.00
61	0	0.12	0.10	0.02
62	0	0.14	0.10	0.04
63	0	0.18	0.10	0.08
64	0	0.46	0.10	0.36
65	0	0.17	0.10	0.07

21.	831.
21.	535.
21.	344.
21.	224.
21.	177.
21.	222.
21.	333.
21.	441.
21.	510.
21.	549.
21.	666.
21.	985.
21.	1452.
21.	1867.
21.	2138.
21.	2308.
21.	2899.
21.	4724.
21.	7854.
21.	12829.
21.	19211.
21.	23496.
21.	22532.
21.	17798.
21.	12585.
21.	8464.
21.	5807.
21.	4137.
21.	3028.
21.	2172.
21.	1445.
21.	904.
21.	551.
21.	285.
21.	162.
21.	90.
21.	63.
21.	46.
21.	35.
21.	28.
21.	30.
21.	54.
21.	118.
21.	305.
21.	614.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDQ

66	0	0.13	0.10	0.03	21.	827.
67	0	0.02	0.02	0.00	21.	770.
68	0	0.02	0.02	0.00	21.	561.
69	0	0.02	0.02	0.00	21.	376.
70	0	0.02	0.02	0.00	21.	245.
71	0	0.02	0.02	0.00	21.	162.
72	0	0.02	0.02	0.00	21.	110.
73	0				21.	77.
74	0				21.	56.
75	0				21.	43.
76	0				21.	35.
77	0				21.	29.
78	0				21.	23.
79	0				21.	21.
80	0				21.	21.
81	0				21.	21.
82	0				21.	21.
83	0				21.	21.
84	0				21.	21.
85	0				21.	21.
TOTAL		30.60	4.90	25.70	6755.	1785. 175393.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 1
ENTER TIME INTERVAL(MIN)= 60.

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 2
ENTER DRAINAGE AREA (SQMI) = 10.50
SELECT 1-3 (1=INPUT UH, 2=CLARK, 3=SNYDER) 2
ENTER NUMBER OF TIME-AREA ORDINATES (0=NONE)= 0
ENTER CLARKS TC AND R (HRS) = 7.63 4.88

TP	CP	TC	R
6.35	0.683	7.63	4.88

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 3
ENTER RATIO IMPERVIOUS = 0.00
SELECT 1-3 (1=RAIN, 2=SPS, 3=PMS) 3
ENTER PMS INDEX RAINFALL (IN) = 24.00
ENTER R6,R12,R24,R48,R72,R96 = 107.00 122.00 137.00 151.00 159.00
ENTER TRFPC AND TRSDA (SQMI) = 0.00 10.50
SELECT 1-3 (1=INIT+CONST, 2=ACUM LOSS, 3=SCS) 1
ENTER INITIAL LOSS(IN), CONSTANT LOSS(IN/HR) = 1.00 0.10

SELECT 1-6 (1=TIME INT,2=UNIT H,3=RAIN,4=RUNOFF,5=PNT,'6=STOP) 4
ENTER A TITLE PLEASE - POCANTICO PMF
ENTER STRTQ,QRCSN,AND RTIOR = 21.00 21.00 1.00

HR	MIN	RAIN	LOSS	EXCESS	UNIT	RG	RECSN	FLOW
1	0	0.02	0.02	0.00	42.	21.	21.	
2	0	0.02	0.02	0.00	15.	21.	21.	
3	0	0.02	0.02	0.00	30.	21.	21.	
4	0	0.02	0.02	0.00	46.	21.	21.	
5	0	0.02	0.02	0.00	60.	21.	21.	
6	0	0.02	0.02	0.00	69.	21.	21.	
7	0	0.05	0.05	0.00	72.	21.	21.	
8	0	0.05	0.05	0.00	68.	21.	21.	
9	0	0.05	0.05	0.00	57.	21.	21.	
10	0	0.05	0.05	0.00	46.	21.	21.	
11	0	0.05	0.05	0.00	38.	21.	21.	
12	0	0.05	0.05	0.00	31.	21.	21.	
13	0	0.21	0.21	0.00	25.	21.	21.	
14	0	0.25	0.25	0.00	20.	21.	21.	
15	0	0.32	0.18	0.14	16.	21.	27.	
16	0	0.80	0.10	0.70	13.	21.	72.	
17	0	0.29	0.10	0.19	11.	21.	179.	
18	0	0.23	0.10	0.13	9.	21.	333.	
19	0	0.03	0.03	0.00	74.	21.	509.	
20	0	0.03	0.03	0.00	60.	21.	672.	
21	0	0.03	0.03	0.00	49.	21.	789.	
22	0	0.03	0.03	0.00	40.	21.	838.	
23	0	0.03	0.03	0.00	3.	21.	808.	
24	0	0.03	0.03	0.00	2.	21.	714.	
25	0	0.19	0.10	0.09	2.	21.	604.	
26	0	0.19	0.10	0.09	18.	21.	513.	
27	0	0.19	0.10	0.09	15.	21.	453.	
28	0	0.19	0.10	0.09	12.	21.	423.	
29	0	0.19	0.10	0.09	11.	21.	419.	
30	0	0.19	0.10	0.09	.	21.	434.	
31	0	0.48	0.10	0.38	.	21.	473.	
32	0	0.48	0.10	0.38	.	21.	548.	
33	0	0.48	0.10	0.38	.	21.	662.	

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

C-14

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

34	0	0.48	0.10	0.38
35	0	0.48	0.10	0.38
36	0	0.48	0.10	0.38
37	0	2.06	0.10	1.96
38	0	2.47	0.10	2.37
39	0	3.09	0.10	2.99
40	0	7.62	0.10	7.72
41	0	2.88	0.10	2.78
42	0	2.26	0.10	2.16
43	0	0.29	0.10	0.19
44	0	0.29	0.10	0.19
45	0	0.29	0.10	0.19
46	0	0.29	0.10	0.19
47	0	0.29	0.10	0.19
48	0	0.29	0.10	0.19
49	0	0.01	0.01	0.00
50	0	0.01	0.01	0.00
51	0	0.01	0.01	0.00
52	0	0.01	0.01	0.00
53	0	0.01	0.01	0.00
54	0	0.01	0.01	0.00
55	0	0.03	0.03	0.00
56	0	0.03	0.03	0.00
57	0	0.03	0.03	0.00
58	0	0.03	0.03	0.00
59	0	0.03	0.03	0.00
60	0	0.03	0.03	0.00
61	0	0.12	0.10	0.02
62	0	0.14	0.10	0.04
63	0	0.16	0.10	0.08
64	0	0.46	0.10	0.36
65	0	0.17	0.10	0.07
66	0	0.13	0.10	0.03
67	0	0.02	0.02	0.00
68	0	0.02	0.02	0.00
69	0	0.02	0.02	0.00
70	0	0.02	0.02	0.00
71	0	0.02	0.02	0.00
72	0	0.02	0.02	0.00
73	0			
74	0			
75	0			
76	0			
77	0			
78	0			
79	0			
80	0			
81	0			
82	0			
83	0			
84	0			
85	0			
86	0			
87	0			
88	0			
89	0			

21.	218.
21.	1012.
21.	1229.
21.	1518.
21.	1986.
21.	2729.
21.	4025.
21.	6001.
21.	8383.
21.	10796.
21.	12757.
21.	13868.
21.	14006.
21.	13179.
21.	11674.
21.	9968.
21.	8372.
21.	6996.
21.	5836.
21.	4847.
21.	4003.
21.	3286.
21.	2685.
21.	2191.
21.	1790.
21.	1463.
21.	1196.
21.	980.
21.	806.
21.	672.
21.	587.
21.	556.
21.	560.
21.	584.
21.	598.
21.	592.
21.	557.
21.	467.
21.	387.
21.	312.
21.	257.
21.	213.
21.	176.
21.	146.
21.	122.
21.	102.
21.	87.
21.	75.
21.	65.
21.	57.
21.	50.
21.	45.
21.	40.
21.	37.
21.	34.
21.	32.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

90	0				21.	30.
91	0				21.	28.
92	0				21.	27.
93	0				21.	26.
94	0				21.	24.
95	0				21.	22.
96	0				21.	21.
97	0				21.	21.
98	0				21.	21.
99	0				21.	21.
100	0				21.	21.
101	0				21.	21.
102	0				21.	21.
TOTAL		30.60	4.90	25.70	67.0.	2142. 175876.

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

DESIGNED BY NFD

DATE 8.7.78

CHECKED BY _____

PAGE C-17 OF

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT Pocahontas REF. DWGS. _____

5. RAILWAY PAVEMENT CURVE

2. Discrete over degree ϕ $\frac{1}{2}$

1. 4 4

0				
1	5.2	64		20E
2	5.1			5977
3	5.1			1131
4	5.1			1792
5	5.2	✓		2576

DALE

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDG

DESIGN BRIEF

DESIGNED BY NFD

DATE 8.7.78

CHECKED BY _____

PAGE LB OF _____

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT 1000.400 REF. DWGS. _____

SPILLWAY H. 2ND CURVE

b. Discharge Over Gate - Cont. Head (feet)

$$Q = \frac{2}{3} \sqrt{2g} C L H_1^{3/2} - H_2^{3/2}$$

$$L = 300 = 6 \text{ feet } H_2 = 0$$

$$H_1 \quad C \quad \frac{2}{3} \sqrt{2g} \quad L \quad H_1^{3/2} - H_2^{3/2} \quad (H_1^{3/2} - H_2^{3/2}) \quad Q$$

0							
1							
2							
3							
4							
5							
6	.7	.64	221	14.7	2.8	11.9	2611
7	.6	.65	223	18.5	5.2	13.3	2961
8	.5	.67	225	22.6	8.0	14.7	33
9	.45	.67	226	27.0	1.2	15.9	36
10	.4	.68	227	31.5	14.7	16.9	39
11	.36	.68	228	36	18.5	18.0	42
12	.33	.69	229	40.6	22.6	19.0	4503
13	.31	.69	230	46.9	27.0	19.9	4716
14	.28	.69	231	52.5	31.6	20.8	4930
15	.27	.69	232	58.7	36.5	22.4	5309
16	.25	.70	240	64.0	41.6	22.4	5376
17	.23	.70	240	70.0	46.9	23.2	5563

DALE

DESIGN BRIEF

DESIGNED BY NFD

DATE 8.7.78

CHECKED BY _____

PAGE C-19 OF _____

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT 1 Canal REF. DWGS. _____

SPILLWAY			ROUTED FLOW	
WATER FLOW AND SPILLWAY			HEAD	Q
14	E	L	H ²	Q
1	2.64	411	1	1000
2			2.5	3063
3			5.2	5628
4			8.0	8654
5			11.2	12122
6			14.7	16152
7			18.	20024

DALE

DESIGN BRIEF

DESIGNED BY NFD

DATE 87.78

CHECKED BY _____

PAGE C-20 OF _____

PROJECT NO. _____ SHORT TITLE _____

DESIGN SUBJECT FL. AC. T. D. REF. DWGS. _____

STAGE - DISCHARGE				TRAFFIC		
DESC.	ELEV.	H	Q [*]	Q _{DAY}	Q _{TOT}	
	215	0			0	
	216	1	20		205	
	217	2	50		597	
	218	3	11		1131	
	219	4	17		1792	
	220	5	25		2576	
	221	6	26		2618	
	222	7	29		2966	
	223	8	33		3350	
	224	9	36		3634	
	225	10	38		3855	
TOT DAM	226	11	42	1182	5294	
	227	12	45	3063	7526	
	228	13	41	5628	10344	
	229	14	49	8619	13599	
	230	15	53	1222	17431	
	231	16	53	1652	21528	
	232	17	55	2024	25592	

* SLUICE GATES COMPLETE & OPEN.

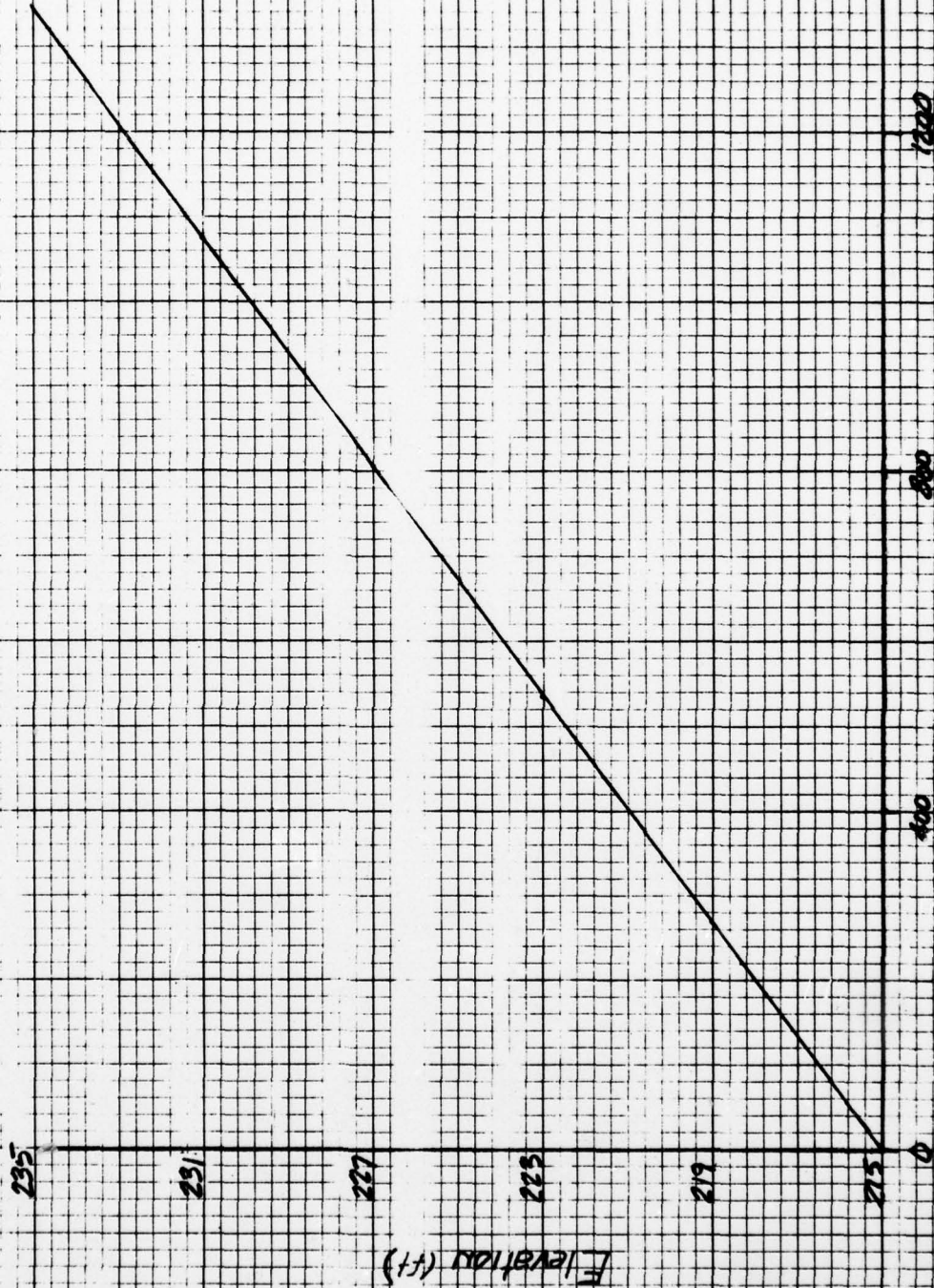
MADE IN U.S.A.

DIE

NO. 10 GEN. 14 PER INCH

POCAHONTIC

STAGE - STORAGE PLOT



Storage (Acre-Ft)

12-7

00100 A POCANTICO

0110 A RESERVOIR ROUTING OVER STRUCTURE OF SPF

0120 A SERVICE SPILLWAY ONLY - GATES FULLY OPEN

0130 B	60	1								
0140 I	3									
0150 K	0									
0160 M	-1	10.5								
0170 N	21	22	30	63	132	226	328	419	479	498
0180 N	472	413	347	291	248	217	193	184	185	212
0190 N	269	360	480	618	798	1044	1416	2045	2997	4140
0200 N	5296	6236	6767	6831	6428	5697	4873	4101	3436	2872
0210 N	2391	1978	1626	1331	1089	891	730	599	493	405
0220 N	333	279	243	219	204	189	173	153	117	94
0230 K	1									
0240 Y			1							
0250 I	1						-1			
0260 Z	0	50	100	320	750	840	960	1020	1080	1120
0270 3	0	205	597	2576	5274	10344	13589	17431	21528	25592
0280 K	99									
0290 A										
0300 A										
0310 A										

00100 A POCANTICO

0110 RESERVOIR ROUTING OVER STRUCTURE OF PMF

0120 A SERVICE SPILLWAY ONLY - GATES FULLY OPEN

0130 B	60	1								
0140 I	3									
0150 K	0									
0160 M	-1	10.5								
0170 N	21	27	72	179	333	509	672	789	838	808
0180 N	714	604	513	453	423	419	434	473	548	662
0190 N	818	1012	1229	1518	1986	2729	4025	6001	8383	10796
0200 N	12757	13868	14006	13179	11674	9968	8372	6996	5836	4847
0210 N	4003	3286	2685	2191	1790	1463	1196	980	806	672
0220 N	587	556	560	584	598	592	557	467	387	312
0230 K	1									
0240 Y			1							
0250 I	1						-1			
0260 Z	0	50	100	320	750	840	960	1020	1080	1120
0270 3	0	205	597	2576	5294	10344	13589	17431	21528	25592
0280 K	99									
0290 A										
0300 A										
0310 A										
0SAVE										

POCANTICO
RESERVOIR ROUTING OVER STRUCTURE OF SPF
SERVICE SPILLWAY ONLY - GATES FULLY OPEN

JOB SPECIFICATION

NQ	NWR	NMIN	IDAY	IHR	ININ	METRC	IPLT	IPRT	NSTAN
60	1	0	0	0	0	0	0	0	0
JOPER					NWT				
3					0				

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDC	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	10.50	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

21.	22.	30.	63.	132.	226.	328.	419.	479.	498.
472.	413.	347.	291.	248.	217.	193.	184.	185.	212.
269.	360.	480.	618.	798.	1044.	1416.	2045.	2997.	4140.
5296.	6236.	6767.	6831.	6428.	5697.	4873.	4101.	3436.	2872.
2391.	1978.	1626.	1331.	1089.	891.	730.	599.	493.	405.
333.	279.	243.	219.	204.	189.	173.	153.	117.	94.

	PEAK	6-HOUR	2-HOUR	72-HOUR	TOTAL VOLUME
CFS	6831.	6209.	51.	1420.	85221.
INCHES		5.50	11.17	12.58	12.58
AC-FT		3081.	4254.	7047.	7047.

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTD	LAG	AMSK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE#	0.	50.	100.	320.	750.	840.	960.	1020.	1080.	1120.
OUTFLOW#	0.	205.	597.	2576.	5294.	10344.	13589.	17431.	21528.	25592.

TIME	EOP STOR	AVG IN	EOP OUT
1	5.	21.	21.
2	5.	22.	21.
3	6.	26.	23.
4	7.	47.	29.
5	12.	98.	49.
6	21.	179.	87.
7	35.	277.	142.
8	51.	374.	212.
9	66.	449.	328.
10	76.	489.	406.

11	81.	485.	445.
12	80.	443.	444.
13	76.	380.	413.
14	71.	319.	367.
15	65.	270.	319.
16	59.	233.	277.
17	55.	205.	242.
18	51.	189.	216.
19	49.	185.	202.
20	49.	199.	201.
21	52.	241.	218.
22	58.	315.	265.
23	67.	420.	341.
24	80.	549.	443.
25	97.	708.	573.
26	118.	921.	759.
27	146.	230.	1014.
28	190.	731.	1402.
29	257.	521.	2009.
30	354.	1569.	788.
31	480.	4718.	588.
32	623.	5766.	1490.
33	752.	6502.	5392.
34	787.	6799.	7358.
35	769.	6630.	6340.
36	762.	6063.	5952.
37	737.	5285.	5213.
38	690.	4487.	4912.
39	615.	3769.	4438.
40	530.	3154.	3906.
41	447.	2632.	3378.
42	369.	2185.	2884.
43	300.	1802.	2392.
44	245.	1479.	1897.
45	203.	1210.	1525.
46	171.	990.	1235.
47	145.	811.	1005.
48	125.	665.	820.
49	108.	546.	672.
50	95.	449.	555.
51	83.	369.	464.
52	73.	306.	387.
53	65.	261.	325.
54	59.	231.	279.
55	55.	212.	246.
56	52.	197.	222.
57	50.	181.	203.
58	47.	163.	191.
59	43.	135.	175.
60	38.	106.	155.

SUM

84855.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7358.	5861.	3140.	1414.	84855.
INCHES		5.19	11.13	12.53	12.53
AC-FT		2908.	6232.	7016.	7016.

RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	6831.	6209.	3151.	1420.	10.50
ROUTED TO	0	7358.	5861.	3140.	1414.	10.50

POCANTICO
 RESERVOIR ROUTING OVER STRUCTURE OF PMF
 SERVICE SPILLWAY ONLY - GATES FULLY OPEN

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	INH	ININ	METRC	IPLT	IPRT	NSTAN
60	1	0	0	0	0	0	0	0	0
JOPER					NWT				
3					0				

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	IAPE	JPLT	JPRT	INAME
0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDC	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	10.50	0.0	0.0	0.0	0.0	0	0	0

INPUT HYDROGRAPH

21.	27.	72.	179.	333.	509.	672.	789.	838.	888.
714.	604.	513.	453.	423.	419.	434.	473.	548.	662.
818.	1012.	1229.	1518.	1986.	2729.	4025.	6001.	8383.	10796.
12757.	13868.	14006.	13179.	11674.	9968.	8372.	6996.	5836.	4847.
4003.	3286.	2685.	2191.	1790.	1463.	1196.	980.	806.	672.
587.	556.	560.	584.	598.	592.	557.	467.	387.	312.

	PEAK	6-HOUR	1 HOUR	72-HOUR	TOTAL VOLUME
CFS	14006.	12713.	800.	396.	13763.
INCHES		11.26	2.68	5.66	25.66
AC-FT		6307.	1000.	14368.	14368.

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	IAPE	JPLT	JPRT	INAME
0	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IFES	ISAME
0.0	0.0	0	1	0

NSTPS	NSTDL	LAG	MSKK	X	TSK	STORA
1	0	0	0	0.0	0.0	-1.

STORAGE#	0.	50.	100.	320.	750.	840.	960.	1020.	1080.	1120.
OUTFLOW#	0.	205.	597.	2576.	1294.	1344.	13589.	17431.	21528.	25592.

TIME	EOP STOR	AVG IN	EOP OUT
1	5.	21.	21.
2	5.	24.	22.
3	7.	50.	30.
4	14.	126.	58.
5	28.	256.	115.
6	50.	421.	204.
7	74.	591.	392.
8	95.	731.	558.
9	111.	814.	692.
10	118.	823.	763.

11	118.	761.	762.
12	112.	659.	706.
13	103.	559.	626.
14	94.	483.	553.
15	87.	438.	497.
16	82.	421.	460.
17	80.	427.	443.
18	81.	454.	448.
19	85.	511.	479.
20	93.	605.	541.
21	105.	740.	643.
22	121.	915.	790.
23	141.	1121.	969.
24	166.	1374.	1188.
25	200.	1752.	1494.
26	252.	2358.	1962.
27	338.	3377.	2693.
28	491.	5013.	3654.
29	722.	7192.	5119.
30	857.	9590.	10003.
31	895.	11777.	11831.
32	953.	13313.	13395.
33	968.	13937.	14109.
34	954.	13593.	13422.
35	915.	12427.	12371.
36	854.	10821.	10735.
37	810.	9170.	8675.
38	786.	7684.	7290.
39	764.	6416.	6069.
40	739.	5342.	5222.
41	686.	4425.	4892.
42	605.	3645.	4375.
43	514.	2986.	3800.
44	424.	2438.	3236.
45	343.	1991.	2720.
46	275.	1627.	2172.
47	224.	1330.	1715.
48	187.	1008.	1375.
49	157.	893.	1114.
50	135.	739.	911.
51	118.	630.	758.
52	107.	572.	657.
53	101.	558.	603.
54	99.	572.	587.
55	99.	591.	589.
56	99.	595.	592.
57	98.	575.	583.
58	94.	512.	548.
59	86.	427.	489.
60	78.	350.	421.

SUM 172940.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	14109.	12655.	6380.	2882.	172940.
INCHES		11.21	22.61	25.54	25.54
AC-FT		6278.	12662.	14300.	14300.

C-27

RUNOFF SUMMARY - AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	0	14006.	12713.	6400.	2896.	10.50
ROUTED TO	0	14109.	12655.	6380.	2882.	10.50

APPENDIX D

REFERENCES

APPENDIX D

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

REFERENCES

1. Department of the Army, Office of the Chief of Engineers. National Program of Investigation of Dams; Appendix D: Recommended Guidelines for Safety Inspection of Dams, 1976
2. The University of the State of New York - The State Education Department - State Museum and Science Service - Geological Survey: Geological Map of New York (1970)
3. U.S. Nuclear Regulatory Commission: Design Basis Floods for Nuclear Power Plants, Regulating Guide 1.59, Revision 2, August 1977
4. Water Resources Engineers, Inc., Lower Hudson River Basin, Hydrologic Flood Routing Model, January 1977
5. Linsley and Franzini: Water Resources Engineering, Second Edition, McGraw-Hill (1972)
6. Louis C. Schreiner and John T. Riedel: Hydrometeorological Report No. 51, U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Weather Service, Office of Hydrology; Silver Springs, Maryland, September 1976
7. Ven Te Chow: Handbook of Applied Hydrology, McGraw-Hill, 1964
8. The Hydrologic Engineering Center: Computer Program 723-X6-L2010, HEC-1 Flood Hydrograph Package, User's Manual, Corps of Engineers, U.S. Army, 609 Second Street, Davis, California 95616, January 1973
9. The Hydrologic Engineering Center, Art Pabst: Computer Program UHCOMP, Unpublished, Corps of Engineers, U.S. Army, 609 Second Street, Davis, California 95616
10. North Atlantic Regional Water Resources Study Coordinating Committee: Appendix C, Climate, Meteorology and Hydrology, February 1972
11. Soil Conservation Service (Engineering Division): Urban Hydrology for Small Watersheds, Technical Release No. 55, U.S. Department of Agriculture, January 1975
12. Sherard, Woodward, Gizienki, Clevenger: Earth and Earth - Rock Dams, John Wiley and Sons, Inc., 1963
13. H.W. King, E.F. Brater: Handbook of Hydraulics, McGraw-Hill, 5th Edition, 1963

14. Ven Te Chow: Open Channel Hydraulics, McGraw-Hill, 1959
15. Bureau of Reclamation, United States Department of the Interior,
Design of Small Dams: A Water Resources Technical Publication,
Third Printing, 1965
16. Preliminary Brittle Structures Map of New York, New York State
Geological Survey, 1977

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report Pocantico Lake Dam Lower Hudson River Basin, Westchester County, NY Inventory No. N.Y. 49		5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program
7. AUTHOR(s) John B. Stetson		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Dale Engineering Company, Inc. Bankers Trust Building Utica, New York 13501		8. CONTRACT OR GRANT NUMBER(s) DACW 51-78-C-0035
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Conservation/ 50 Wolf Road Albany, New York 12233		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Department of the Army 26 Federal Plaza/ New York District, CofE New York, New York 10007		12. REPORT DATE 19 September 1978
		13. NUMBER OF PAGES
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; Distribution unlimited.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety National Dam Safety Program Visual Inspection Hydrology, Structural Stability Westchester County Pocantico Dam Pocantico River		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. Pocantico Lake Dam was judged to be unsafe non-emergency due to a seriously inadequate spillway.		